This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

Usage guidelines

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

+ *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.

+ *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.

+ *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.

+ *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at `http://books.google.com/`

B 1,205,948

1837
ARTES VERITAS SCIENTIA
LIBRARY OF THE
UNIVERSITY OF MICHIGAN
E PLURIBUS UNUM
SI QUAERIS PENINSULAM AMOENAM
CIRCUMSPICE

35
.A631

PROCEEDINGS

OF THE

AMERICAN PHILOSOPHICAL SOCIETY

HELD AT PHILADELPHIA FOR PROMOTING USEFUL KNOWLEDGE.

VOL. XXXVII. JULY, 1898. NO. 157.

CONTENTS.

PAGE

Stated Meeting, January 7, 1898 3

The Altitude of the Aurora above the Earth's Surface. By CLEVELAND ABBE 4

Stated Meeting, January 21, 1898 7

Description of Four New Species of *Rocinela*, with a Synopsis of the Genus. By HARRIET RICHARDSON 8

Specializations of the Lepidopterous Wing; the Pieri-Nymphalidæ (with plates). By A. RADCLIFFE GROTE, A.M. 17

An Old Broadside, with a Reference to the Throne of Congress (with plate). By JULIUS F. SACHSE 45

Stated Meeting, February 4, 1898 51

Stated Meeting, February 18, 1898 52

Stated Meeting, March 4, 1898 53

Stated Meeting, March 18, 1898 54

Initiation Ceremonies of Australian Tribes (with plate). By R. H. MATHEWS, L.S. 54

Preliminary Note on the Selenodont Artiodactyla of the Uinta Formation. By W. B. SCOTT 73

Stated Meeting, April 1, 1898 81

Notes on Kansan Drift in Pennsylvania. By PROF. EDWARD H. WILLIAMS, JR 84

A Note on the History of the Jefferson Manuscript Draught of the Declaration of Independence in the Library of the American Philosophical Society. By I. MINIS HAYS, M.D. 88

The Genesis of Bitumens as Related to Chemical Geology. By S. F. PECKHAM 106

Herpetological Notes. By JOHN VAN DENBURGH 139

Stated Meeting, April 15, 1898 142

A Journal Kept During the Siege of Fort William Henry, August, 1757. By I. MINIS HAYS, M.D. 143

Divisions of Australian Tribes. By R. H. MATHEWS, L.S. . 151

Stated Meeting, May 6, 1898 154

Adjourned Meeting, May 13, 1898 155

Stated Meeting, May 20, 1898 162

The Production of an Asphalt Resembling Gilsonite by the Distillation of a Mixture of Fish and Wood (with plate). By WILLIAM C. DAY 171

PHILADELPHIA:
THE AMERICAN PHILOSOPHICAL SOCIETY,
104 South Fifth Street,
1898.

Henry M. Phillips Prize Essay.

PHILADELPHIA, 104 SOUTH FIFTH STREET,
APRIL 5, 1897.

THE AMERICAN PHILOSOPHICAL SOCIETY held at Philadelphia for Promoting Useful Knowledge has the honor to announce that an award of the Henry M. Phillips Prize will be made during the year 1899; essays for the same to be in the possession of the Society before the first day of May, 1899. The subject upon which essays are to be furnished by competitors is:

The development of the law, as illustrated by the decisions relating to the police power of the State.

The essay shall not contain more than one hundred thousand words, excluding notes. Such notes, if any, should be kept separate as an Appendix.

The Prize for the crowned essay will be two thousand dollars lawful gold coin of the United States, to be paid as soon as may be after the award. The Society invites attention to the regulations governing said prize, which accompany this circular.

William V. McKean, Craig Biddle, Mayer Sulzberger, C. Stuart Patterson, Joseph C. Fraley, Frederick Fraley, *President of the Society, Horace Jayne, M.D.,* Treasurer of the Society, Committee on the Henry M. Phillips Prize Essay Fund.*

The essays must be sent, addressed to Frederick Fraley, President of the American Philosophical Society, Philadelphia.

---

* Elected Treasurer American Philosophical Society, January 7, 1898, in place of J. Sergeant Price, Esq., deceased, August 15, 1897.

REGULATIONS.

Competitors for the prize shall affix to their essays some motto or name (not the proper name of the author, however), and when the essay is forwarded to the Society it shall be accompanied by a sealed envelope, containing within, the proper name of the author, and, on the outside thereof, the motto or name adopted for the essay.

At a stated meeting of the Society, in pursuance of the advertisement, all essays received up to that time shall be referred to a Committee of Judges, to consist of five persons, who shall be selected by the Society from nomination of ten persons made by the Standing Committee on the Henry M. Phillips Prize Essay Fund.

Essays may be written in English, French, German, Dutch, Italian, Spanish or Latin; but, if in any language except English, must be accompanied by an English translation of the same.

No treatise or essay shall be entitled to compete for the prize that has been already published or printed, or for which the author has received already any prize, profit or honor, of any nature whatsoever.

All essays must be *clearly* and *legibly* written or printed on one side of the paper only.

The literary property of such essays shall be in their authors, subject to the right of the Society to publish the crowned essay in its Transactions or Proceedings.

PROCEEDINGS

94565-

OF THE

AMERICAN PHILOSOPHICAL SOCIETY

HELD AT PHILADELPHIA

FOR

PROMOTING USEFUL KNOWLEDGE.

VOL. XXXVII.

JANUARY TO DECEMBER, 1898.

PHILADELPHIA:
THE AMERICAN PHILOSOPHICAL SOCIETY.
1898.

PROCEEDINGS

OF THE

AMERICAN PHILOSOPHICAL SOCIETY,

HELD AT PHILADELPHIA, FOR PROMOTING USEFUL KNOWLEDGE.

VOL. XXXVII. JANUARY, 1898. No. 157.

Stated Meeting, January 7, 1898.

Dr. J. C. MORRIS in the Chair.

Present, 17 members.

Dr. T. J. J. See and Mr. Sydney Geo. Fisher, newly elected members, were presented to the Chair and took their seats.

Acknowledgments of election to membership were read from Messrs. Charles De Garmo, Arnold E. Ortmann, Thomas J. J. See, Alden Sampson, Sydney George Fisher, Benjamin Kendall Emerson, Francis L. Patton, Edward S. Holden, and Ethelbert Dudley Warfield.

An invitation was received from the Academy of Natural Sciences of Philadelphia, to participate in a memorial meeting commemorative of Harrison Allen, M.D., and George H. Horn, M.D., to be held at the Academy on December 31, at 8 o'clock.

The Judges and Tellers of the annual election reported the following officers elected for the ensuing year:

President.

Frederick Fraley.

Vice-Presidents.

E. Otis Kendall, William Pepper, Coleman Sellers.

Secretaries.

Persifor Frazer, I. Minis Hays, Frederick Prime,
S. P. Sadtler.

Curators.

J. Cheston Morris, Benjamin Smith Lyman, Henry Pettit.

Treasurer.
Horace Jayne.
Councillors for three years.
Henry C. Baird, Isaac J. Wistar, Jacob M. DaCosta.
Councillor for one year, to fill an unexpired term.
George F. Edmunds.

Dr. I. Minis Hays was nominated for Librarian for the ensuing year.

Prof. Cleveland Abbe read a paper on "The Accepted Altitude of the Aurora Borealis."

Mr. Sachse and Mr. Cook offered some remarks in discussion.

Dr. T. J. J. See presented a paper for the *Transactions* on "The Evolution of the Stellar Systems," which was discussed by Prof. Doolittle, Prof. Snyder, Dr. See and Prof. Abbe.

The Society was adjourned by the presiding member.

THE ALTITUDE OF THE AURORA ABOVE THE EARTH'S SURFACE.

BY CLEVELAND ABBE.

(Read January 7, 1898.)

During the past three centuries numerous observers and physicists, astronomers and magneticians have endeavored to contribute to our knowledge of the altitude of the region whence the auroral light proceeds, and still the greatest diversity of opinion seems to prevail on this subject. Some observers have seen the light in such positions between themselves and neighboring objects as to demonstrate that the aurora, like the lightning, descends to the very surface of the earth and may even be entirely confined to the lowest stratum: prominent among these are Captain Parry, Sir James Clark Ross and Sir John Ross, his uncle, Dr. Walker and Prof. J. P. Lesley.

Others, such as Dr. Richardson, Sir John Franklin, Silbermann, have seen it so located among the clouds that its origin must be placed at or below their level and, therefore, within a few thousand feet of the earth's surface. On the other hand, those who have calculated the altitudes of specific beams and arches by trigonometrical or equivalent methods have generally found figures indicating altitudes between twenty and a hundred miles. Perhaps the highest altitudes that have been deduced were the following: Dalton, 150 miles; Loomis, 400 to 600; Bergman, 468; Boscovich, 825; Fournerius, 1006; Twining, 1100; Boller, 2000 kilometers, or 1243 miles.

Those who delight in numerical calculations accept these larger altitudes and content themselves with saying that the altitude of the aurora ranges from 50 miles upward to 1000. The experimental physicists, by studying the analogies between the auroral light and the discharge of electricity through vacuum tubes, have shown that the auroral phenomena harmonize in part at least with those observed in vacua such as might occur at moderate altitudes. Thus, Miller and De La Rue give altitudes of from ten to forty miles. Espy and Bache maintained that observers a few miles apart did not and could not have observed the same arches. The most careful observers have in many cases defended the accuracy of the observations made under circumstances that admit of no doubt that the auroral light in the free atmosphere often emanates from points within a few yards of the observer.

Lemstrom has sought to reconcile the diverse conclusions by maintaining that while many auroras are quite high up and belong to the upper air, yet those in extreme northern latitudes most generally belong to the lowest strata and follow the unevenness of the ground, appearing as glows around the mountain top, or as rays directed toward prominent objects.

The object of the present paper is to study some of the numerous observations, calculations and opinions bearing on the nature and the altitude of the auroral light. We shall not especially consider the electrical origin, or the source of the electricity, but simply acquiesce in the universal conviction that it really is one form of electrical discharge, our main object being to ascertain whether we can in any way definitely fix its *locus* in the atmosphere.

The most instructive method of procedure consists in taking up the consideration of a number of authorities in chronological order, by which means one is led to appreciate the slow progress of knowledge and the difficulty which many investigators have felt, from time to time, in giving up preconceived views without having anything better to accept in their place. There is nothing more difficult than to recognize the fact that all our ideas are wrong, and that we are wholly in the dark with regard to the nature of that which our eyes behold so plainly. How many thousands of years elapsed before modern science gave us any clue to the true nature of the rainbow, and how difficult it has been to eradicate from our text-books the crude ideas of Descartes, Huyghens and Sir Isaac Newton which made the rainbow to be a phenomenon of dispersion and substitute the correct view of Thomas Young, who showed it to be a phenomenon of interference.

Possibly we must go through a similar series of changes in our views with regard to the auroral light until we recognize that each observer sees his own aurora as a so-called optical illusion.

There are several forms of optical illusion that are evidently connected with the aurora. Some of these were recognized long since, while others are still deceiving our senses and perplexing our calculations.

As we pursue our reading chronologically, among the different authorities, we shall perceive how one after another is led to suspect and fully recognize some one or other of these optical or perspective illusions, while others, inattentive thereto, plunge deeper into misleading calculations. If, at the end of our consideration of the subject, we sum up all that has been shown to be probable or demonstrated to be true, we shall almost necessarily conclude that the determination of the altitude of the aurora is a much more delicate problem and perhaps also a more indefinite problem than we have hitherto believed.

After reviewing the literature of the subject since the time of Halley, we find that the methods of determining the altitude of specific features of the aurora may be enumerated as follows: (1) Parallax method; (2) Galle's first method; (3) Galle's second method; (4) Bravais' method of amplitudes and its modifications by Fearnley, Newton, Nordenskiold and Bergmann; (5) Bravais' method by the apparent breadth of the arch; (6) Bravais' velocity method; (7) my method, by the simultaneous motion of waves at the zenith and beams above an arch; (8) Gyllenskiold's method, by the apparent length of the auroral beam.

All these agree in one fundamental assumption, that the observed beams and arches have an individual existence and a definite *locus*. But this assumption is negatived by the equal frequency of negative and positive parallaxes whenever the parallax method is applied.

The only conclusion possible is that the observers do not see the same object, partly because the aurora is too low down and partly because there are optical illusions due to alignment. We are viewing a luminous sheet which is folded and refolded. We are also viewing a great collection of bright beams and bright pencils of light parallel to each other like the trees in a forest. Every slight change in the position of the observer alters the collective appearance of the pencils and the folds. The only method of determining parallaxes with any confidence consists in requiring two or more observers to start at the same point, fixing their attention upon one feature; separate to a short distance in opposite directions and return until they have satisfied themselves that the illusions due to perspective and alignment are not sufficient to nullify the influence of parallax.

Stated Meeting, January 21, 1898.

Vice-President SELLERS in the Chair.

Present, 14 members.

Mr. Alden Sampson, a newly elected member, was presented to the Chair and took his seat.

Acknowledgments of election to membership were received from Richard Olney, William H. Dall, Leroy W. McCay.

Mr. Rosengarten read an obituary notice of the late Treasurer, J. Sergeant Price, Esq.

Dr. Hays was elected Librarian for the ensuing year.

The appointment of the Standing Committees was referred to the President.

The following papers were presented:

For the *Transactions:*

Posthumous papers of the late Dr. Harrison Allen on
"The Glossophaginæ" and on
"The Skull and Teeth of the Ectophylla alba."

For the *Proceedings:*

"Specializations in the Lepidopterous Wing—Pieri-Nymphalidæ," by Mr. A. R. Grote.

"Description of Four New Species of Rocinela, with a Synopsis of the Genus," by Miss Harriet Richardson.

"An Old Broadside, with a Reference to the Throne of Congress," by Mr. Julius F. Sachse, which was discussed by Messrs. McKean, Rosengarten, Hildeburn and Sellers.

The meeting was adjourned by the presiding officer.

DESCRIPTION OF FOUR NEW SPECIES OF *ROCINELA*, WITH A SYNOPSIS OF THE GENUS.

BY HARRIET RICHARDSON.

(Read January 21, 1898.)

I.

The species of *Rocinela* here described were collected by the steamer *Albatross*, of the U. S. Fish Commission, during its various cruises in different localities. One of the species herein described comes from the Alaskan coast; another is from the coast of Cuba, off Havana, and the third comes from the southern part of the Gulf of California.

The new species exhibit unique characters not found in any other representatives. One, *R. cornuta*, has the antero-lateral angles of the first thoracic segment extended forward on each side of the eyes, but not touching them, thus giving the head the appearance of being immersed or deeply set in this segment. Another, *R. tuberculosa*, presents a row of small tubercles on the posterior margin of each one of the thoracic and abdominal segments of the body. In *R. cubensis*, the frontal margin of the head is greatly produced into a large rounded process with a concave surface.

The genus *Rocinela* is now known to include nineteen species,[1] of which nine were included in the monograph published in 1880 by Schiœdte and Meinert,[1] and the others in the order hereinafter noted.

---

[1] *R. lilljeborgii* Bovallius (*Bihang Sv. Ak. Handl.*, 1885, Vol. x, No. 10, pp. 3–10, Pls. 1, 2) has been referred to the genus *Syscenus* Harger, and identified with *S. inflexis*, Harger's type species (G. O. Sars, "An Account of the Crustacea of Norway," Vol. ii, *Isopoda*, Pls. *iii*, iv, pp. 67, 68).

R. danmoniensis (pp. 383–389, Tab. xi, Fig. 1).

R. insularis (p. 390, Tab. xii, Figs. 1–3).

R. dumerilii (pp. 391–393, Tab. xii, Figs. 4–6).

R. maculata (pp. 393, 394, Tab. xii, Figs. 10–12).

R. americana (pp. 394, 395, Tab. x, Figs. 16–18).

R. orientalis (pp. 395, 396, Tab. xiii, Figs. 1, 2).

R. australis (pp. 397–399, Tab. xii, Figs. 13–15).

R. signata (pp. 399–401, Tab. xiii, Fig. 3).

R. aries (pp. 401–403, Tab. xiii, Figs. 7, 8).

R. alaskensis (= *Æga alaskensis* Lockington). "Description of Seventeen New Species of Crustacea," Lockington, *Pro. Cal. Acad. of Sciences*, 1876, Vol. vii, Pt. i, p. 46, 1877.

R. vigilans. "On Some New Australian Marine Isopoda," W. A. Haswell, *Proceedings of the Linnean Society of New South Wales*, 1880, Vol. v, p. 472, Pl. 16, Fig. 2.

R. oculata. "Reports on the Results of Dredging, under the Supervision of Alexander Agassiz, on the East Coast of the United States, during the Summer of 1880, by the U. S. Coast Survey Steamer *Blake*, Commander J. R. Bartlett, U. S. N., Commanding," xxiii, "Report on the Isopoda," Oscar Harger, *Bull. Mus. C. Z.*, 1883, Vol. ix, No. 4, pp. 97–99, Pl. 3, Fig 2.

R. spongiocola. "Notes on Tasmanian Crustacea with Descriptions of New Species," George M. Thomson, *Papers and Proceedings of the Royal Society of Tasmania*, 1892 (1893), pp. 57, 58, Pl. 3, Figs. 3–8.

R. laticauda. "Reports on the Dredging Operations off the West Coast of Central America to the Galapagos, to the West Coast of Mexico, and in the Gulf of California, in charge of Alexander Agassiz, carried on by the U. S. Fish Commission Steamer *Albatross*, during 1891, Lieut.-Commander Z. T. Tanner, U. S. N., Commanding," xxii, "The Isopoda," H. J. Hansen, *Bull. Mus. C. Z.*, 1897, Vol. xxxi, No. 5, p. 108, Pl. 3, Figs. 2, 3.

R. modesta., *op. cit.*, p. 109.

R. cornuta, sp. nov.

---

[1] Symbolæ ad monographiam Cymothoarum, Crustaceorum, Isopodum, Familiæ," J. C. Schiœdte et Fr. Meinert, *Naturhistorisk Tidsskrift*, 1879—1880, Vol. xii, pp. 383-403, Pls. 10-13.

R. cubensis, sp. nov.
R. japonica, sp. nov.
R. tuberculosa, sp. nov.

II.

Analytic key of all the known species of *Rocinela,* with the addition of four new species.

- *a*. Eyes contiguous.
  - *b*. Head produced into process in front . . . *R. oculata* Harger.
  - *b'*. Head not produced into process in front.
    - *c*. Flagellum of second pair of antennæ as long as peduncle. . *R. spongiocola* Thomson.
    - *c'*. Flagellum of second pair of antennæ more than twice as long as peduncle . . . . *R. vigilans* Haswell.
- *a'*. Eyes not contiguous.
  - *b*. Flagellum of second pair of antennæ with 14–16 joints.
    - *c*. Eyes close together.
      - *d*. Head with frontal area excavated, bicarinated, front roundly produced with raised margin . . . . *R. danmoniensis* Leach.
      - *d'*. Head without median excavation, not bicarinated . . . *R. insularis* Schiœdte and Meinert.
    - *c'*. Eyes widely separated.
      - *d*. Propodus of prehensile legs with two to four spines.
        - *e*. First thoracic segment with antero-lateral angles produced horn-like at sides of head . . . . *R. cornuta,* sp. nov.
        - *e'*. First thoracic segment normal.
          - *f*. Frontal margin of head produced.
            - *g*. Head tuberculated . . . . . *R. cubensis,* sp. nov.
            - *g'*. Head not tuberculated.
              - *h*. Head with frontal excavation.
                - *i*. Front bicarinated. . . . *R. dumerilii* Leach.
                - *i'*. Front not bicarinated . *R. japonica,* sp. nov.
              - *h'*. Head without frontal excavation . . . . . . *R. modesta* Hansen.
          - *f'*. Frontal margin of head not produced.
            - *g*. Terminal segment of body linguate; both branches of the uropods crenulate on their exterior margins.

h. Spots present on both sides of the fourth thoracic segment . . . . *R. maculata* Schiœdte and Meinert.

h'. Spots wanting on fourth thoracic segment.

i.. Spots present on fourth and fifth abdominal segment and base of terminal segment. . *R. alaskensis*[1] (Lockington).

i'. Spots wanting on fourth and fifth abdominal segments and terminal segment . . . . *R. americana* Schiœdte and Meinert.

g'. Terminal segment of body subtriangular; branches of uropods not crenulate on their exterior margins . *R. orientalis* Schiœdte and Meinert.

d'. Propodus of prehensile legs with five or six spines.

e. Increase in breadth of abdomen from base to fourth segment . . . . *R. laticauda* Hansen.

e'. No increase in breadth of abdomen from base to fourth segment . . . *R. australis* Schiœdte and Meinert.

b'. Flagellum of second pair of antennæ with ten or eleven joints.

c. Tubercles developed on all the segments of the body . . . *R. tuberculosa,* sp. nov.

c'. No tubercles developed on body.

d. Terminal segment of body ornamented with a pair of narrow semi-lunar bands separated by a longitudinal stripe . . . . . . *R. signata* Schiœdte and Meinert.

d'. Terminal segment of body ornamented with a very wide crescentiform band, from whose posterior border three large hastiform stripes project backwards. *R. aries* Schiœdte and Meinert.

Æga belliceps Stimpson (*Proc. Ac. Nat. Sci.*, Philadelphia, 1864, xvi, p. 155), is also undoubtedly a *Rocinela* and may even prove to be identical with *Rocinela alaskensis* (Lockington) in which case the proper name will be *Rocinela belliceps*.

---

[1] *Æga alaskensis* Lockington (*Proc. Cal. Academy of Sciences*, 1876, Vol. vii, Pl. i, p. 46, 1877) must be referred to the genus *Rocinela,* as it agrees in every respect with the characteristics of that genus. When identifying *Æga alaskensis* Lockington with *Rocinela,* I found in conversation with Dr. Benedict that he had already recognized this relation.

III.

Rocinela cornuta, sp. nov. Figs. 1, 2.

Length of body, two and one-quarter times its greatest breadth. Outline, oval; surface smooth, with scattered points of depression. Head subtriangular, having a medium excavation. Its frontal margin is produced forward in a long and broad projection, widely rounded at its extremity, and curving upward. Eyes large and situated at some distance apart. The first antenna reaches the anterior margin of the first thoracic segment; its flagellum contains six articles. The second antenna extends to the posterior margin of the second thoracic segment; its flagellum is sixteen-jointed.

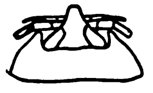


FIG. 1.—Head, × 1⅜.

The thoracic segments are subequal. The antero-lateral angles of the first segment are greatly produced and extend forward a little less than half the length of the head, including the projection. These antero-lateral projections of the first segment do not follow closely the lines of the head, but rather extend out straight in a direction which is parallel to that of the frontal projection of the head. The extremities of these projections are rounded. The epimera of all the segments point downward and do not extend beyond the post-lateral angle of their respective segments with the exception of the sixth and seventh ones.

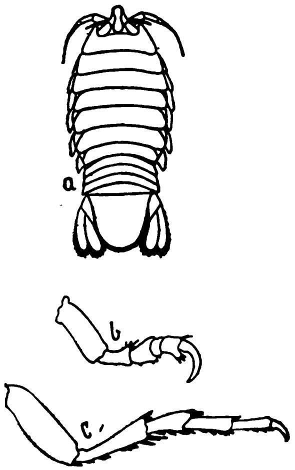


FIG. 2.—*a. Rocinela cornuta*, ♂, slightly reduced. *b.* Leg of first pair, × 4. *c.* Leg of fourth pair, × 4.

The first segment of the abdomen is almost entirely covered by the seventh thoracic segment. The last segment is rounded posteriorly and is faintly crenulate. The two branches of the uropods are similar in shape and size; the inner branch, being the longer, reaches the extremity of the abdomen. The uropods as well as the abdominal segment are furnished with hairs.

The propodus of the prehensile feet is armed with three spines, and three blunt ones are found on the merus. The gressorial feet are long and slender and covered with spines.

Type.—The type specimen was found off Shumagin Bank, Alaska, Station 3338, 625 fathoms (U. S. Nat. Mus., No. 20086).

Rocinela cubensis, sp. nov. Figs. 3, 4.

Outline of body oval, surface smooth.

Head with rounded lateral margins. Its anterior margin is produced forward in a large rounded projection, whose breadth is equal to its length, and whose upper surface is deeply concave with upturned edges. This projection extends forward for about half its length and then upward, the change in direction being gradual. Eyes large and composed of ten rows of ocelli. Two small tubercles are situated between the eyes, and in the middle of the head and back of these is an arc-shaped depression. The first antenna reaches the posterior margin of the head; its flagellum contains six articles. The second antenna extends to the posterior margin of the third thoracic segment; its flagellum contains fifteen articles.

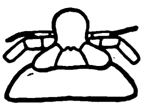


FIG. 3.—Head.

The thoracic segments are subequal in length. The epimera are long and narrow, with very acute posterior angles.

The first segment of the abdomen is almost entirely concealed by the last thoracic segment. The fifth is likewise covered at the sides by the fourth segment. The last abdominal segment is triangular in shape with a rounded posterior margin. The outer branch of the uropods is very broad and oar-shaped, with a rounded extremity. The inner branch is long and slender, of equal breadth throughout its length and rounded on its posterior margin. The inner branch is the longer one. Both are fringed with hairs.

In the prehensile legs of this species the basis presents a row of tubercles on its superior margin. There are two spines on this propodus and three on the merus. The gressorial legs are but slightly spinulose.

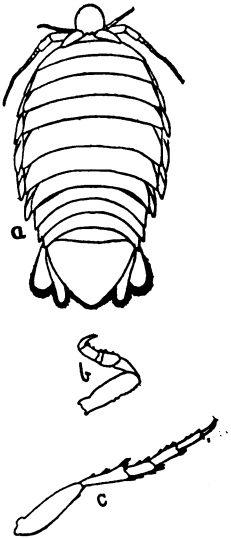


FIG. 4.— *a. Rocinela cubensis*, ♂, × 2¼. *b.* Leg of first pair, × 4⅓. *c.* Leg of fourth pair, × 4⅓.

Type.—The type specimen was found off Havana, lat. N. 23° 11′, long. W. 82° 19′ 6″, Station 2341, 143 fathoms (U. S. Nat. Mus., No. 20087).

Rocinela laticauda, Hansen[1] Fig. 5, 6.

Head, with a median projection, long and broad, extending slightly downward and having a blunt extremity. Eyes large, with ten rows of ocelli. The first antenna, with a flagellum containing six articles, reaches the posterior margin of the head. The second antenna extends to the middle of the second thoracic segment; its flagellum contains fifteen articles.

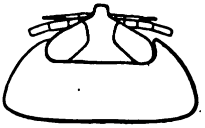


FIG. 5.—Head × 2½.

The thoracic segments are equal in length. The first is deeply bisinuated, its antero-lateral angles extending up the side of the head to about the middle of the eyes. The epimera of the second, third and fourth segments are rounded posteriorly; those of the remaining segments have pointed extremities.

The first segment of the abdomen is almost entirely covered by the last thoracic segment. The fifth segment, as well as this one, is narrower than the intervening segments, and not as broad as the base of the terminal segment. The last segment is widely rounded posteriorly and is fringed with rough hairs which almost conceal its crenulated margin; at the base it is impressed on either side of a keeled centre; the outer branch of the uropods is almost twice as broad as the inner branch; they are about equal in length. Both are fringed with hairs and indistinctly crenulate.

The prehensile legs are stout and short. There are four spines on the propodus and five on the merus, besides numerous hairs. The gressorial legs are likewise stout and furnished with spines and hairs.

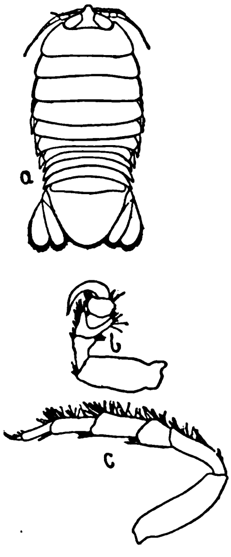


FIG. 6.—*a. Rocinela laticauda*, ♂, slightly reduced. *b.* Leg of first pair, × 4. *c.* Leg of fourth pair, × 4.

---

[1] The description of the above species was written and the drawings made when Dr. Hansen's type specimen was returned to the U. S. Nat. Mus., and his manuscript sent to the press. As there are a few differences in the specimens, it was thought best to publish the new description.

The specimen described came from Alaska, off Unimak Island, Station 3225, 85 fathoms (U. S. Nat. Mus., No. 20088).

Distribution.—One specimen was found off San Luis Obispo Bay, California, Station 3195, 252 fathoms; one off Esteros Bay, California, Station 3194, 92 fathoms, and another at Puget Sound, Washington, Station 3067, 82 fathoms. The specimens from the coast of California are smaller in size and of very much lighter color than the other specimens. They are similar in other respects. Dr. Hansen's type specimen is from Acapulco, Mexico, Station 3418. It differs from the specimen herein described in the length of the second pair of antennæ, which extend to the middle of the third thoracic segment, while in the specimen we have described they extend only to the middle of the second thoracic segment; in the broader and longer terminal segment of the body, and in the increased number of spines on the propodus, and the decreased number of spines on the merus of the prehensile legs.

Rocinela japonica, sp. nov. Fig. 7–9.

Surface of body punctate and covered with black or brown dots. Color yellow, marked lightly in such a way as to present a mottled appearance. At the base of the terminal segment of the body, there are two small spots of brown, separated by a distance equal to half the width of the segment. Head subtriangular, excavated in the centre between the eyes and having the lateral margin in front of the eye produced into a lobe; the extreme front being truncate with rounded angles and curving slightly upward. The lobe in front of the eye extends half way between the eye and the extreme front. The eyes, which are small, are separated by a distance of half the width of the head. The first antenna, with a flagellum of six joints, reaches the posterior margin of the head. The second antenna, with a flagellum of fifteen joints, extends to the posterior margin of the second thoracic segment.

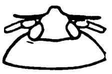


FIG. 7.
Head, × 1⅓.

The epimera of all the segments of the thorax are acute, the posterior angles more rounded in the first two, but sufficiently pointed, in the remaining four. The epimera of the last two segments take a more oblique direction than the preceding ones, and extend laterally as far as the outer margins of the abdominal segments.

The first abdominal segment is almost entirely covered. The posterior angles of these segments are very acute and are produced at the sides beyond the terminal segment and the basal joints of the uropods. The terminal segment is linguate and obscurely crenulate on its posterior margin. The internal branch of the uropods is somewhat longer than the external one, but the two are equal in width. They are both armed with spines on their outer margins.

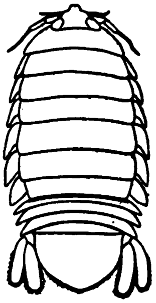


Fig. 8. — *Rocinela japonica*, ♂, × 1⅓.

The prehensile legs are slender. There are three or four hair-like spines on the propodus and five blunt ones on the merus. The gressorial legs are likewise slender and spinulose.

Of this species a single individual was found at Hakodate Bay, Japan, Station 3659, depth fifteen and a half fathoms (U. S. Nat. Mus., No. 20651).

This species is closely related to *R. modesta* Hansen. It differs from that species in the length of the first pair of antennæ, which extend only to the middle of the last joint of the peduncle of the second pair of antennæ, while in *R. modesta* Hansen they extend a little beyond the peduncle of the second pair of antennæ; in the greater development of the lateral margin of the head in front of the eye into lobes; in the excavation in the frontal area of the head; in the extreme front being directed upward; in the number of spines on the merus of the prehensile legs, five spines being characteristic in our species, three or four in Dr. Hansen's species; in the markings on the surface of the body of small black dots and the presence of two larger spots at the base of the terminal segment of the body.

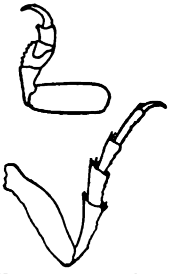


Fig. 9.—Leg of first pair, × 3. Leg of fourth pair, × 3.

Rocinela tuberculosa, sp. nov. Fig. 10.

Surface of body punctate and marked with small black dots. The posterior margin of each of the thoracic and abdominal segments is lined with a row of tiny tubercles, above which is a row of small black dots.

Head subtriangular, rounded in front. Eyes large and situated at a distance of one-third of the head apart. The first antenna, with a flagellum of five articles, reaches the posterior margin of the head; the second antennæ extends to the posterior margin of the second thoracic segment; its flagellum contains eleven articles.

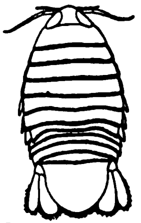


Fig. 10.—*Rocinela tuberculosa*, ♂, × 2⅓.

The posterior margin of all the thoracic segments is edged with a row of small tubercles. The epimera are narrow, those of the second, third and fourth segments being rounded at the top, while those of the last three segments are more acute.

The first abdominal segment is entirely concealed by the last thoracic segment. The second, third, fourth and fifth segments are likewise edged with a row of small tubercles. The last segment is widely rounded. The outer branch of the uropods is somewhat narrower and shorter than the inner one and is rounded at its extremity. The inner one is bluntly rounded. Both are fringed with hairs, and on their exterior margins are armed with spines. The prehensile legs have three long, stout spines on the merus and two on the propodus. The gressorial legs are covered with spines.

Two individuals of this species were found in the southern part of the Gulf of California, at Station 2824, eight fathoms, type (U.S. Nat. Mus., No. 20652), and Station 2828, ten fathoms.

SPECIALIZATIONS OF THE LEPIDOPTEROUS WING; THE PIERI-NYMPHALIDÆ.

(Plates I-III.)

BY A. RADCLIFFE GROTE, A.M.

(*Read January 21, 1898.*)

An immediate incentive to the present study is the statement, in *Evolution and Taxonomy*, that we find, in the Nymphalidæ, "an even greater specialization of the wings than exists in the Pieridæ." It may be premised that Prof. Comstock's classification unites in one family two seemingly distinct types under the term Nymphalidæ. Also that the neurational character given in the more recently issued "Manual" of the same author for the Pieridæ would exclude the Leptidianæ. The two wing types of the Nymphalidæ of Mr. Scudder and Prof. Comstock overlap. The Nymphalidæ proper, as I would limit the family, have vein iii_4 of the fore wings thrown off upon the external margin below apices throughout all the leading groups. But in the Fritillaries, which seems to be the most generalized group, there are genera, like Euptoieta, in which this vein reaches the apex, as in all the other brush-footed butterflies. But, commonly, we can tell a Nymphalid from a Satyrid by this character. Again, on the hind wings, the Nymphalidæ proper show vein iv_3 entirely joined to the cubitus, and not issued from the cross-vein. In the Limnadidæ, Heliconidæ and Agapetidæ, which appear to form another branch of the "brush-footed" group of butterflies, this latter condition of vein iv_3 is only reached in a small group of specialized Satyrids, the Pararginæ. This character is plainly secondary, one which might occur independently in different groups not immediately phylogenetically connected.

The specializations of the lepidopterous wing, here chiefly considered, are visible among what I have called the "movable veins" and cannot be relied upon as decisive in general phylogeny. Their study leads to an arrangement of genera and species, in most cases upon a more positive basis, by supplying us with a gauge by which we may distinguish the younger from the older form. The norm by which these specializations are apprehended lies in the principle we have already set forth: the amount of the absorption is the measure of the specialization.

The two principal directions in which the specialization is manifested are: 1. the suppression of the media, common to both wings, and 2. the suppression of the branches of the radius, confined to the fore wings in most Lepidoptera and occurring sporadically. The latter is probably reminiscent of that action which has completed its task upon the hind wings of such Lepidoptera which have the radius already reduced to a single unbranched vein.[1]

NOMENCLATURE.

The application of literary terms to structural groups, wider in extent than specific, has become uncertain through the publication of varying and subjective opinion. It has, therefore, become necessary to associate the generic title with a single specific type, ascertained by historical methods, in order to go safely. The failure to employ the name of the genus in this manner renders Mr. Reuter's recently published volume at times unintelligible. The same remark applies to Dr. Chapman's admirable paper on butterfly pupæ, where exactly what is meant by the terms "Satyrus, Epinephele, Hipparchia," does not appear (*Entom. Record*, vi, 152). So far as the diurnals are concerned the authority I recognize is Mr. Scudder's *Historical Sketch*, Salem, 1875. Since, in exceptional cases, this work has been seemingly properly corrected and even in one case by the author himself, a republication up to date would be one of the most grateful of literary helps to the systematist, to whom it is a matter of comparative indifference what term he uses so that it is correct and exactly conveys his meaning, while it should be one necessarily understood. Since the difference between genera and species is quantitative, the limitations of the former will be always more or less a matter of opinion. As matters are now and unless a standard is recognized, the object of nomenclature will be defeated so far as generic titles used by themselves are concerned. Both to give greater endurance to his work and to make it a useful addition to generic definitions extant in literature, the systematist might confine his studies to species used for generic types as far as possible and neglect those not yet so favored. To locate and compare genera their types need alone be considered; by clearly explaining the structure of these incidental help will be afforded to reach an approximative agreement as to the limitation of generic groups. Generic terms should always have the same meaning attached to them, and this meaning can only be derived from the structure of their types. I remember that Moeschler, disputing the validity of the genera allied to Smerinthus and wishing to discredit minute generic differentiation, asked triumphantly, To what genus, then, do the hybrids between species belonging to these different allied genera belong? A little reflection might have led him to ask the question also, And to what species? For although, to Moeschler, a genus would seem to have constituted a fixed quality, yet it is seen not to be so and that the genus idea is an extension of the species idea, and both ideal categories having a relative being without sharp outlines. In the formation of generic categories the idiosyncrasy of the describer comes easier to the surface, as in Mr. Scudder's genera; but for the purposes of the systematist these are as good as any, and better than most; all that is wanted being a certain name attached to a certain thing. The describers of species are the *avant couriers* of the systematists, one no more useful than the other, and any adverse criticism of the former class, who throw the first light upon our darkness, must be due to a lack of thought and consideration. Nomenclature itself belongs to letters and is part of the machinery which biologists must use to work with. And we may remember here the fact that we possess no entire and satisfactory definition for the term *individual* as used in biology. So that it perhaps naturally follows that we are at a loss to define adequately groups or associations of which the individual forms the unit.

---

[1] Consult, "Mittheilungen a. d. Roemer Museum," 8, February, 1897; "The Hind Wings of the Day Butterflies," Can. Ent., 29, 174; also several other papers more recently issued.

The following notes explain the changes made by me in

THE NOMENCLATURE OF THE PIERI-NYMPHALIDÆ.

Agapetidæ.—I use this term instead of Satyridæ because the generic title Satyrus Latreille is preoccupied (Scudder, *l. c.*, 265), and is properly replaced by the title Agapetes Bilberg, 1820 (*l. c.*, 104), with the same type, *A. galathea.* It is impossible to separate the name of a higher group from that of the genus upon which it is based. If Satyrus properly falls then Satyridæ must also go. But the type of Satyrus remains and the new generic title of this type by natural right replaces the old title in all its various modifications. It appears that the more modern title Satyridæ replaces the Satyri of older authors who antedate the Tentamen in the use of a plural form, thus in recognizing a group or family in our sense. In addition the term Oreas (Oreades) used by Hübner in 1806 is itself preoccupied. So that the claim of Agapetidæ to designate the family, with *Agapetes galathea* as its type, seems indisputable. Arge of Esper and also of Hübner would be preoccupied by Schrank (*l. c.*, 117).

Limnadidæ.—The earliest plural form applied particularly to a member of this group is Limnades of Hübner, 1806, based upon *Limnas chrysippus* as type. This must, therefore, replace the term Danaidæ of modern writers, a term based upon the later Danaus (*plexippus*) of Latreille, 1809, for which Scudder proposes to retain Danaida of the same author of 1805 (*l. c.*, 153), perhaps disputably, since Latreille's change seemed warranted at that time. Once a synonym always a synonym. In any case the modern Danaidæ cannot claim any connection directly with the *Danai festivi*, etc., of Linné, since that group had no legal standing; no genus of that name upon which it could be based having been published. Cuvier's similar use of "Danai" included also the Pieridæ (*l. c.*, 154), and, therefore, Limnadidæ has a clear right to recognition.

N. B.—I take the opportunity here to change my term Capis to Capisella since there is an earlier genus, Capys of Hewitson, which interferes (PROC. AMER. PHILOS. SOC., xxxiv, 434). I also resume my name for ***Lomanaltes lætulus***, since from the description it must be that Mr. Walker's species differs.

GENERAL DESCRIPTIONS.

These are limited to the holarctic fauna, of which the principal genera appear to have been examined. There remain, however, several types I have been unable to obtain.

Pieridæ. Pierinæ.—Primary wings, *specialization by suppression of the media:* Traces of the base of the media in the shape of scars I have found in Eurymus and Callidryas. In *Colias rhamni*, a mimetic form springing evidently from the same line, I fail to find the least impression. Backward spurs occur in Aporia and faint traces in Callidryas. The cell nowhere completely opens. The cross-vein becomes partially degenerate in a number of instances. In all the genera yet examined, vein iv_1, the upper branch of the media, leaves the cross-vein and is given off, outside of median cell, from the lower branch of radius. This character I only find again on the hind wings of Nemeobius. The middle branch of media leaves cross-vein above the middle and is radially inclined.

Primary wings, *suppression of radial branches:* End forms of specialization in this direction are offered by Mancipium, Pontia and Nathalis, where the five branches are reduced to three. The bulk of the forms: Pieris, Eurymus, Colias, Callidryas, Eurema, etc., are four-branched. As yet I find only certain of the Anthocharini, therefore the more generalized group, five-branched.

Secondary wings, *suppression of media:* Taking the homologies as given, the vein iv_1 assumes function and position of iii_5 on primaries; usually the piece between its base and the issuance of iii_5 from radius must be reckoned to cross-vein. The inauguration of the movement of the movable veins appears to take place on secondaries generally, since in a number of Lepidoptera vein iv_2 remains central on primaries, while on secondaries of same wings it inclines radially or cubitally. As on primaries, the cross-vein nowhere disappears in the Pierinæ and the cell remains closed.

Other features of specialization by absorption of veins: On primaries, vein viii is present, either as a scar or, in some instances, as an apparently functional, "tubular" vein. It takes the aspect of a short, oblique, more or less rigid piece, running from vein vii to internal angle. It has usually lost here the appearance of being originally a longitudinal vein rooting in base of wing and, as in the Limnadidæ, appears more as a supporting strap. However, in Terias, where it is reduced, it assumes nearly the loop-like shape. The minute study of this vein is a matter of some difficulty. The appearance of vein viii in the Hesperiadæ corresponds essentially with that in the Sphingidæ and Saturniades, where it has the loop-like shape. These quantitative changes are probably correlated with mechanical function. On the secondaries of the Pieridæ, there are but slight differences in the amount of absorption of veins ii and iii at base; on the whole, the absorption is small and herein is the wing generalized. Vein i, the so-called "præcostal spur," is usually present; it vanishes in the Eurymini and in Colias (Gonepteryx); it may be seen in Callidryas. There is no equality of specialization, no exact and equal step in all these instances and the position of a genus or group can here not be assigned with certainty from any one character. Better, as a guide, is the radial specialization on primaries, where it may be laid down as an axiom that the five-branched forms cannot possibly have been derived from the three or four-branched, and that they are consequently descendants of older types and clearly more generalized insects. But neither may we group all the three or four-branched species together, since these specializations are reached upon what are otherwise evidently independent phylogenetic lines, in all cases necessarily succeeding a five-branched ancestor. Thus the three-branched Pontia is clearly an offspring from the five-branched Anthocharini; the three-branched Nathalis is more immediately connected with the four-branched Terias and Eurema.

Leptidianæ.—So different is this butterfly and so isolated its present position, that we must almost leave it out of sight in discussing the specialization of the Whites. The suppression of the media is nearly limited to the extinction of the basal portion. The position of vein iv_2 is central, or very nearly so, on fore wings, cubital on hind wings; we have here an exceptional parallelism with Papilio. The radius is generalized, five-branched. No trace of vein viii appears on fore wings. The median cells are small, retreating; the veins long. In comparison with the other whites, the wings are in a generalized state, but the chances are that in Leptidia (Leucophasia) we have a survival of what was a more extended group at one period and that the generalization is strictly relative. The disappearance of vein viii points in this direction.

A feature of generalization is offered by ii and iii of secondaries which appear completely separate.

Nymphalidæ.—This term is used in a restricted sense, equivalent to the Nymphalinæ of Comstock, or typical Nymphalids, apparently taken from Scudder.

Nymphalinæ.—Characterized by the position of i, ii and iii, of hind wings, which spring from one point owing to the fact that ii and iii are absorbed or fused up to the origin of i, which remains nearly constant in all the butterflies examined. This character is secondary in its nature and I have not yet studied the phylogeny of the genera fully. In this subfamily the suppression of the media reaches its widest extent and is only paralleled again in the Attacinæ. In the most specialized forms the cell entirely opens, all trace of the cross-vein vanishes on both wings. Vein iv_2 becomes radial. Vein iv_1 leaves upper angle of cell and does not fuse with radius.

Argynninæ.—Characterized by the fusion of ii and iii on hind wings not attaining the point of origin of i. No taxonomical features of neuration clearly define the minor groups, which are generally bound together by steps in the grade of specialization shown in the gradual suppression of the media. The "Goat Weed Butterflies" belong probably to the Charaxinæ, a specialized form having lost the "long fork" through absorption, but are not so specialized as the Nymphalinæ or "Purples," as might be inferred by their position in Comstock's *Manual.* In this work, as well as Mr. Scudder's, the sequence, as based on a specialization of the wings (and no other characters or class of characters allow of such fine distinction) is irregular. In the Check List of Dr. Skinner (1891) the disarrangement is nearly complete.

Agapetidæ (Satyridæ).—Wings (except in the Pararginæ) as in Pieridæ, but vein viii of fore wings entirely absent; vein iii_4 of fore wings to apex. The veins in many forms show a secondary sexual character in the enlargement of vein ii, the cubitus, or vii at base in male. This character is indicated in the Nymphalidæ, in Potamis and some Fritillaries and in the Ager.

Pararginæ.—The cross-vein of hind wings, or its traces, joins the cubitus; in other words the union of vein iv_3 with cubitus is complete, since this branch of the media has left the cross-vein. Here there is, in this apparently restricted group, a complete parallelism with the Nymphalidæ, from which the butterflies differ by the position of vein iii_4 of fore wings. Cross-vein degenerate between iv_2 and iv_3 or cubitus, as might be expected, on hind wings, while on fore wings the specialization has not proceeded so far. Genera: Pararge and Lasiommata.

Agapetinæ (Type: *Agapetes galathea*).—Vein iv_3 of hind wings springs from cross-vein as in Pieridæ and next two succeeding families. All the North American genera I have yet examined (but many remain), and most European Satyrids belong here. The cross-vein is partially degenerate, but as long as vein iv_3 keeps its position and does not fuse with cubitus this may not here disappear. Vein i of hind wings varies in expression and, almost vanishing in Cœnonympha, is quite absorbed in Pyronia. It is diminished in Cercyonis. Probably its study may give us a better arrangement of the European forms. In Eumenis it terminates squarely as in the Pararginæ, and again in Nymphalis. In the other genera it is pointed. Owing to the inequality and slight nature of the specializations in the Agapetinæ, it will require a minute and patient comparison to straighten them out. Any rough classification or sequence attempted on "general principles" must be always nearly valueless. Œneis is evidently a generalized form.

Heliconidæ.—Study of the type: *Heliconius antiochus.* As in all the "brush-footed" butterflies, the radius on fore wings is in a five-branched generalized state, while iv_1 springs from upper corner of median cell. Cells completely closed, the cross-vein merely thinning a little below iv_2. No trace of vein viii, hence more specialized than Limnadidæ and agreeing with Agapetidæ. Vein iv_2 nearly central, a little radially inclined on fore wings and considerably more so on hind wings, where the cell is small, retreating, the veins long. Vein i determinate, pointed. The radius of fore wings is more specialized than in Limnas, where iii_2 leaves the stem opposite cross-vein. Here vein iii_2 arises beyond the cell. A more generalized wing than that of the Agapetidæ, more distinctly a Limnad type. All traces of the base of media disappeared; no trace of backward spurs from cross-vein.

Limnadidæ.—Study of the type: *Limnas chrysippus.* On the five-branched radius of primaries vein iii_2 springs from a point opposite cross-vein. Vein viii on fore wings present strongly developed. Veins strong; cells closed; a backward spur from cross-vein on fore wings opposite iv_2, the position of which is central. On hind wings this vein is slightly radial. Vein i of hind wings imperfectly fused with radius at base; cross-vein angulate. The curious stigma below v_2 is attended by a rounded retreat of the vein, which is here slightly swollen. On comparing this type with that of Heliconius it is seen to be the more generalized. To separate Danaus from Limnas we must encroach apparently upon specific characters.

Libytheidæ.—Vein iii_4 to costa before apex; cross-vein partially degenerate; vein iv_2 on primaries central, on secondaries radial; vein viii of fore wings strongly developed as in Limnadidæ. Outline similar to Polygonia. On secondaries the cross-vein reaches vein iv_1 just immediately before cubitus. Specialization here almost like the Pararginæ. This isolated group, with its strongly developed labial palpi, cannot be referred to the stem of the Nymphalidæ proper (in *sensu mihi*) on account of the position of iii_4 and the presence of viii of primaries. It must be referred back on an independent line to the matrix from which the "brush-footed" butterflies originally sprang. It is now a specialized form as is seen by the extent of absoption of ii and iii, on hind wings, to the point of issuance of i, thus equaling the Pararginæ.

Nemeobiidæ.—Not a typical "brush-foot," but with the fore feet reduced in the male on the Riodinid type. Special examinations of this structure are needed to bring out the points clearly. Wings of the Pieri-Nymphalid pattern, not of the Lycæni-Hesperid. Radius five-branched, generalized. It is thus impossible to bring the butterfly into the Lycæni-Riodinid series in which the radius is specialized, three to four-branched, while the other neurational features contradict the supposition that it could represent a generalized type of the series. The neuration runs parallel with Libythea and the resemblances lie between this butterfly and Pieris. Vein iii_4 seems to join costa just before apex. Cross-vein entire, cells closed; on fore wings vein iv_2 is central, on hind wings radial. Vein viii of primaries seems to be degenerate and I represent it by dots in my original figure. Subsequent studies lead me to believe it wholly or partially tubular. Veins ii and iii of secondaries at base fused nearly to point of issuance of i, hence nearly as specialized as Libythea, much more so than in any Riodinid or Lycænid yet examined. When writing my original paper (in 1896) I failed to note that the family Nemeobiidæ had been recognized, though I have found no description and the study of the neuration seems to have been neglected. To unite this butterfly with the Lycæni-Hesperid branch appears to me a physiological impossibility. It must rather be relegated to a distinct line, running parallel with the Libytheidæ and leading to the main stem of the Hesperiades. Its affinity with the Pieridæ is marked by the position of iv_1, which, on secondaries, has left the upper angle of cell and is fused with the radius to a point much beyond the median cell, as in the Pierinæ. Since there is a parallelism in the specialization between the Lycænid group and the Pieridæ in the reduction of the radial branches, a further parallelism might be made to account for this, especially as on primaries vein iv_1 is fused with radius as in the Theclinæ. But this will not explain the position of vein iii_5 on external margin, the radial position of iv_2 and the more unequal spacing. We might appeal to the imperfection of the geological record and conjure up extinct and intermediate series; but, independent of the fact that such flights of the imagination would lead us nowhere and would excuse even the arrangements proposed by Mr. Meyrick, we cannot do away with the main difficulty, that the wing of Nemeobius is developed upon the Pieri-Nymphalid pattern and that we should not logically graft it upon the Lycæni-Hesperid. The radius is also generalized, five-branched and cannot be derived from a three to four-branched group, which it should have preceded. But the five-branched Hesperiadæ are formed upon another pattern and could hardly have given rise to Nemeobius. The five-branched Hesperiadæ have most plainly produced the three to four-branched Riodinidæ and Lycænidæ. The wing of the latter is just what we might expect from a reduction of the radial branches of Hesperia. The conclusion we may come to is, that we should seek for the origin of Nemeobius in an independent line, and that the structure of the fore feet has been probably independently acquired. There is no difficulty in this, since aborted fore feet are also characteristic of certain moths belonging to the Hypeninæ, notably of *Pallachira bivittata* Grt. There seems to be a latent tendency in this direction which has broken out strongly in the day butterflies.

GENERAL COMPARISONS.

Before entering upon any comparison as to the amount of specialization in the Pieridæ and the "brush-footed" butterflies (=Nymphalidæ of Scudder and Comstock) it will be well to get a mental picture of the neuration of the Pieri-Nymphalidæ as a whole. This can best be obtained by contrasting it with that of an allied wing group in the same structural series, the Lycæni-Hesperidæ. Independent of relative breadth or shape of wing we have in the latter a simpler pattern, the veins more equidistant, an indisposition to fuse and furcate shown by the retention of a central position by vein iv_2; so that as the suppression of the media takes its course this branch tends to degeneration *in situ*, from resisting the attraction of either radius or cubitus. As opposed to this we have a willingness in the Pieri-Nymphalidæ to preserve vein iv_2, which latter tends everywhere to become radial, except in the isolated case of Leptidia, where it becomes cubital. We have a spreading of the veins and abundant traces of unequal specialization. Except in the lycænid reduction of the radial branches, the Lycæni-Hesperiadæ offer few neurational changes to aid our formation of classificatory categories; the Pieri-Nymphalidæ plenty. United by the presence of the looping vein viii, or its traces unequally expressed and sometimes quite vanished, the Hesperiades offer in this way two groups characterized by the peculiar neurational wing pattern; giving us also an instance of parallelism in specialization, in that the Pieridæ sustain an analogous position with regard to the "brush-footed" butterflies (Nymphalidæ, etc.), to that the Riodinid-Lycænids show with respect to the Hesperids or "Skippers." In both these groups the reduction of the radius takes place; the Pierids still showing phases embracing and intermediate between the five and three-branched radius, while no five-branched Lycænid is yet known to me. Thus the gap in the Lycæni-Hesperiadæ between the subgroups is greater than that between the subgroups of the Pieri-Nymphalidæ. But the fact that the reduction of the radial branches has been independently taken up by the two main wing groups of the Hesperiades comes clearly out. I have been unable to find any characters which will always distinguish the neuration of the Hesperiades from the moths. Not so with the Parnassi-Papilionidæ, a distinct major division entirely left out of sight in the present studies.

Having thus endeavored to trace the outlines of the neuration of the Pieri-Nymphalidæ as a whole and to enable the reader to grasp more or less fully the wing structure of this waste of butterflies, we may more in detail compare the wings of the "Whites" with those of the other butterflies in their group. That the radius is specialized in the Pieridæ and generalized in all the other families is the first and obvious difference, one which strikingly throws the balance of specialization to the side of the "Whites." So that in this direction of secondary specialization, which the Pieridæ share with the Parnassiinæ, the Riodini-Lycænidæ, as well as the Saturniades among the moths, the "brush-footed" butterflies (Nymphalidæ of Scudder and Comstock) as well as the Nemeobiidæ have no share and are *hors de concurs*.

We now come to the direction of the suppression of the media. Herein the Pieridæ lag behind the Nymphalidæ (*in sensu mihi*) with one remarkable exception in the position of vein iv_1, the upper branch of the media, which ascends the radius (iii_6) to a point beyond the cell, a character repeated only on the hind wings of Nemeobius. In all the "brush-footed" butterflies this vein never leaves the cross-vein at the extreme upper corner of the median cell. Though the latter open and the disappearance of the media by the distribution of its branches between radius and cubitus become complete, still vein iv_1 never fuses directly with the radius. Did it do so its passage to a point beyond the cell in the process of specialization might be logically expected to follow. What power is it which keeps this vein apart, even in Nymphalis and Potamis, where, in the latter especially, the approximation is carried out so completely? Undoubtedly all these retained and abandoned positions for the veins indicate the action of the dynamical force which fits the wing for variations in the mode of flight. The field observations which are compared with the structure of the wings are as yet scanty in the extreme. I have only brought the opening of the cell and the radial position of iv_2 into a probable relation with a lofty and sailing flight, a tree life like that led by *Potamis iris* or *Philosamia cynthia*. The passage of iv_1 along iii_6 does not seem to help the wing to extended flights. We find it again in the moths, in the Smerinthinæ and Citheroniadæ. The bunching of the two upper branches of the media near the radius at this point seems, on the other hand, to strengthen the primaries. As these veins are retired from the radius and retain their original generalized position on the cross-vein, closing the cell, so does a more modest terrestrial habit of flight seem to prevail; so that it seems probable that the Lepidoptera were not originally high flyers, and that those which now disport among the tree tops are the latest arrivals on their respective and differing lines of phylogenetic descent.

To return to our immediate subject, the comparison of the specializations of the Pieridæ and Nymphalidæ proper. So far as the suppression of the media is concerned, the advantage of the Nymphalidæ is quite clear when the most specialized forms are compared, but even when we descend to the "Fritillaries," where the cell of fore wings closes and vein iv$_2$ becomes quite central, the superiority is kept up. For everywhere on the hind wings of the Nymphalidæ does the lowest branch of the media, vein iv$_3$, completely fuse with the cubitus. The cross-vein above it is always very weak, and even vanishes in Araschnia, Melitæa or Euptoieta.

Leaving the two principal directions in which the movable veins show the effects of specialization, we can compare the Pieridæ and Nymphalidæ upon other points. The most important of these is the fusion of ii and iii upon the hind wings at base. Here the Nymphalidæ continue their advantage. In the Nymphalinæ the absorption extends even to the point of issuance of i, and this measure is attained in the most specialized of the Agapetidæ or "Meadow Browns," the Pararginæ. In the mass of the Nymphalidæ this excess is not reached and the point of absorption falls varyingly short. But still it is always carried to a further point than in the Pieridæ, where the union is very brief and apparently quite wanting in Leptidia. This character is plainly secondary and cannot of itself determine the phylogeny. Again, the amount of absorption of i may be compared. a vein which is relatively constant in its position upon ii, from which it issues. It did not always probably do so, for I have observed in Papilio, Zerynthia (=Thais) and Parnassius, the process by which it has come to be fused with ii, and in the present group traces of its independence may be found in the Limnads or "Milk Weed" butterflies. In the Pieridæ this vein i, the so-called "præcostal spur," tends to be absorbed and disappears in Eurymus (Colias) and Colias (Gonepteryx). Here the parallelism in specialization with the "Blues" is continued. But in the Nymphalidæ it appears everywhere to be strong and well-developed; it is here more generalized. Evidently the strong flight continued to call for a strengthening of the shoulder of the secondary wings. In the flutterings of the "Whites," the "Meadow Browns," the "Blues," this need was not so felt and the vein would tend to disappear.

So much we may say in comparing the Pieridæ with the Nymphalidæ proper, and we may pass more quickly over our comparisons of the "Whites" with the remaining families of "brush-footed" butterflies, the "Nymphalidæ" of Scudder and Comstock. After we leave the Pararginæ, the scale of specialization comes to a standstill or turns gradually against the latter. In the Agapetinæ, containing the mass of holarctic forms of the "Meadow Browns," the lower branch of the media on the hind wings no longer fuses with the cubitus, but, as in the Pieridæ, springs from the cross-vein, the piece between this branch and the cubitus varying in length, and by so much marking here the grade of specialization. Except that vein viii of primaries seems to have been entirely absorbed in the Agapetidæ, it becomes difficult to distinguish their wings from the Whites. In both groups the position of the radial branches is similar. In the male sex the Agapetids show very frequently a bladder-like swelling at the base of ii, iii and vii of primaries, or the swelling may be confined more or less to the first-mentioned veins. In Agapetes it seems confined to ii; I do not find it in my preparations of Oeneis ællo, of which, however, I am uncertain as to the sex. It is a secondary sexual specialization, of which traces occur also in the Nymphalidæ. Like the Pierids, the Meadow Browns tend to lose vein i of secondaries by absorption; I believe, on the whole, that Pyronia represents the most specialized form. The amount of fusion of ii and iii at base still continues greater as against the Pieridæ, but hardly holds its own in comparison with the Argynninæ. In the Morphinæ, which appear to me to be specialized Agapetidæ, the cell opens on hind wings, but remains closed on primaries. They resemble thus the Pararginæ at present rather than the Agapetinæ, and have sprung apparently from the latter. Else, in our holarctic forms, the cell does not open on either wing, while it becomes, in the specialized forms, partially degenerate.

In the Heliconidæ and Limnadidæ the generalization makes itself more and more evident. The strong veining, closed cells, central position of iv_2 all tell against them. Heliconius still lacks vein viii of primaries, but in Limnas it is stronger than in any Pierid. At the close Libythea recovers somewhat of the lost territory, but this isolated butterfly, difficult to intercalate in a sequence, cannot probably alter the average result. Taking this all in all, we must find I believe that the excess of specialization in the direction of the suppression of the media, and in the subsequent points here explained, on the part of the brush-footed butterflies, as a whole, cannot outweigh the absence of specialization by reduction of the branches of the radius; seeing also that only in one family, the typical Nymphalids, is that specialization of the media carried to an excess. We have also the difficulty of estimating the morphological value of the shifting of vein iv_1 in the Pieridæ. While we cannot thus assent to the conclusion expressed by Prof. Comstock in *Evolution and Taxonomy*, that we find in the Nymphalidæ an even greater specialization of the wings than exists in the Pieridæ, we admit that the point of view from which this is regarded may influence any conclusion, while the unequal presentation of the changes in the wings renders a just weighing of the differences a matter of some difficulty. It will be sufficient for my present purpose if the impression left on the mind of the reader is that rank is a relative conception and that it is owing to the constitution of our minds that we are impelled to string one natural object after another, while we are apt to fortify a classificatory preference for a special group out of several lying nearly abreast, by reasons which, sufficiently telling as far as they go, are apt to reflect only one side of a complex subject. I think, then, we may believe that the specialization of the "brush-footed" butterflies is more apparent in the feet than in the wings, and that, if we are not inclined to give them preëminence on that account in our sequences, we shall not be induced to do it upon the statement of Prof. Comstock herein discussed and illustrated.

PHYLOGENETIC LINES AMONG PIERID GENERA.

I have previously shown that coincidence in the number of the radial branches in reduction does not determine common descent, but that a three-branched condition of the originally five-branched radius has been reached independently, not only in different families, but on different generic lines within the same group. It may be assumed that three-branched species, differing otherwise unessentially, are correctly associated by this character; but to use this character anywhere alone for taxonomic purposes, or to assign it a commanding value, would be plainly to go wrong. It is probable, for instance, that the three-branched radius correctly indicates that the species of Thecla (*in sensu mihi*, with the type given by Scudder) are monophyletic and that the four-branched Zephyrini stand, at least constructively, as representing the original condition of their ancestors.

Under these views we may sort out several different lines of probable descent in the holarctic Pieridæ, in which the examples of extreme reduction have been independently developed. It is clear, since nature does not proceed by jumps, that the missing stages between the five-branched ancestors and the three-branched descendants have existed and that forms, which have retained the intermediate character and thus represent an earlier condition, may yet be found and correctly identified. So that we must seek out forms whose main disparity consists in their respective state of specialization of the wings.

Referring to the accompanying phylogenetic table, we may commence our brief study with the so-called "Yellows." In Eurymus (Colias) the second branch of the radius has passed from its normal position before to one removed beyond the cross-vein. In Meganostoma this branch has only progressed to a point opposite the cross-vein. Clearly, Eurymus is the more specialized and younger form since this passage of iii_2 along the main branch of the radius is one indicated on different phylogenetic lines and is evidently a phase of general process by which the radial branches are reduced in number. The normal five-branched radius has this branch, following iii_1, before the cross-vein. Under this view Meganostoma is the representative of the primitive form of Eurymus. The "dog's head" pattern has probably yielded to the terminal band, straightly margined and the reappearance of the "dog's head" in species of Eurymus is due to "reversion." In other words, such species are the more generalized. But, while in the type, *hyale*, the distance which the vein iii_2 has traveled is a considerable one, it is much reduced in another species, *edusa*[1], which is more generalized in this way than *E. hyale*. From the multiplicity of species of Eurymus, especially in North America, it is not improbable that intermediate grades occur uniting the extremes *E. hyale* and *M. cæsonia*. I have not yet found them and Eurymus is yet separable from Meganostoma on this character. For purposes like the present study it is immaterial, so far as the use of the two generic names is concerned, whether such forms are found or not. The systematist needs both terms to designate different grades of specialization. The change in pattern involves a loss of black and not improbably does there exist a tendency, in the direction of specialization, to lose this and perhaps other darker colors upon the same immediate lines.

It is hardly probable that Callidryas is on the direct line of Eurymus, but it represents, in the holarctic fauna, an ancestral phase of development. It has the same four-branched radius, but vein

---

[1] Mr. Meyrick's figure of *edusa* (*Handbook*, 350) is too inaccurately drawn to be of service.

iii_2 has not moved at all from the original position within the cell. It is thus more generalized than either of its associates. From Callidryas-like ancestors may rather have sprung the curious form *Colias rhamni*, belonging to the genus Rhodocera, or again Gonepteryx of authors, but, according to Scudder, wrongly so referred.

In this genus in which the wings have probably been transformed by mimicry to copy the shape of a leaf, vein iii_2 keeps its original place of exit before the cross-vein; consequently it cannot have been derived from forms among which this vein was shifting. It must have been thrown off before Meganostoma-like forms appeared and probably Callidryas represents very nearly its direct line of descent. It is more specialized than Callidryas, not only in the remarkable shape of its wings, but because it has lost by absorption vein i of hind wings, the "præcostal spur" of some writers, which is still retained by Callidryas. The specialization runs in this respect parallel with the branch Eurymus-Meganostoma. In the latter genus a remainder of the vanishing vein i is to be seen which has become lost in Eurymus. The specialization on this phylogenetic line of the typical "Yellows" has not apparently developed a three-branched descendant, at least in the holarctic fauna, and so far as my studies now go. Nor have I yet found the five-branched generalized form, which might represent its more remote ancestry.

Turning to the next line of non-typical "Yellows," the Euremini, we find the three-branched descendant reached in Nathalis. This form has evidently emerged from four-branched ancestors, represented in America by Eurema and Terias, forms which so very nearly agree that I am even at a loss to distinguish them. I make out vein viii of primaries to be quite distinct and relatively strong in Terias, and conclude this may be the sub-specialized form of the two. I cannot now connect this line with the typical "Yellows," and its ancestry must be apparently sought for in more southern regions.

We will now take up the "typical Whites." The three-branched condition is attained by *Mancipium brassicæ*. Here the little remaining branchlet iii_{3+4} of Pieris has at last vanished. But the vein iii_{3+4+5} in which it has lost itself is a little bent at this place. I should not wonder if examples of the "large Cabbage White" might be found retaining some trace of this vanished veinlet. In Pieris I have examined *rapæ* and *napi*, while Prof. Comstock's beautiful figure of protodice appears to agree (*Evolution and Taxonomy*, Pl. ii, Fig. 3).

In all these the little vein iii_{3+4} remains distinct and has not been lost. Evidently Pieris represents the ancestral form of Mancipium and has perhaps been thrown off before the specialization of Pieris has progressed so far. Notwithstanding the similarity of the ornamentation I am not sure that *P. rapæ* is on the direct line of descent. As between *rapæ* and *napi* I incline to consider the latter at present the more specialized. *Aporia cratægi* is evidently a more generalized form, standing a little apart. Vein iii_{3+4} is quite a long furcation, and measures its distance from Pieris. The skeleton of the wing is more powerfully built and vein viii of primaries stronger than in Pieris, in which it seems little better than a scar. The gradation by which this vein, which appears usually like a loop, strap or support to vii at the base, passes into obliteration is so entire that the exact statement of its condition is often difficult either to correctly grasp or record. The "tubular" character disappears by minute gradations; the "scar" aspect and the "tubular" shape are easy to detect, but where the one commences and the other ends it is often hard for me to say. In the holarctic fauna I do not find any form to represent the probably actual five-branched condition of Pieris, but here several types are wanting to me which I should like to have examined. In the genealogical tree of the holarctic butterflies the more generalized Anthocharini must take the place of the common five-branched ancestor of the whole Pierinæ. But this seems to me to stand upon a separate immediate phylogenetic line of its own, notwithstanding some common features of color and marking. With this Anthocharid line we must now in concluding concern ourselves.

Among the Anthocharini, or what we may call the "non-typical Whites," we have, in *Pontia daplidice*, the attainment of the three-branched condition. This butterfly appears to me to have no immediate connection with the "typical Whites," but to be a descendant of Anthocharid ancestry. It is true that Mr. Meyrick refers it without comment to the genus Pieris (*Handbook*, 353), but it is also true that Mr. Meyrick, in the same publication, precedes Pieris by Leptidia (Leucophasia) and this again by Euchloe, and, to make the mixture complete, Gonepteryx (Colias). This sort of work appears to me to prove that Mr. Meyrick's studies are not yet sufficiently "correlated" with the actual facts of structure. If, indeed, the picture which Mr. Meyrick has received of the neuration at all resembles the figures with which his publications are adorned,

no proper judgment could, in my opinion, be formed upon it, and this would perhaps account in part for the seemingly extraordinarily unnatural sequences adopted by him.

The coincidence between the neuration of *Pontia daplidice* and that of *Mancipium brassicæ* is so great, that I am at a loss to give good characters of distinction. But showing, as I do, that the three-branched character of the Pierid primary wing is attained upon obviously distinct lines (*e. g.*, Euremini), this coincidence will not of itself determine the phylogeny. The shape of the wings and the pattern of ornamentation of Pontia are both Anthocharid. It is not conceivable how either could have been derived from Pieris and the "typical Whites." We should have to suppose that the four-branched Pieris threw off the three-branched Mancipium and also the three-branched Pontia; an inference which, considering the want of any near resemblance in the shape and pattern of the wings between the two descendants, or between one of these (Pontia) and the supposed parent stem, must be set down as untenable. More than this, we have in Pontia a similar secondary sexual character in the shape and extent of the wings to that we find in the Anthocharini, no trace of which is evident in Pieris or Mancipium. This character has evidently been retained by Pontia, through an ancestry of which I find one existing representative form, extending back to the five-branched representative of a remote phase which is brought before us now in Anthocharis and Euchloe. I believe that these facts show, that the phylogenetic position heretofore assigned to Pontia, is a discordant one and should be corrected. We may now leave Pontia and look over the more generalized and the typical Anthocharini with their five-branched radius.

Mr. Scudder (*Historical Sketch,* 113) says, regarding the use of the generic term Anthocharis: "As Euchloe must be used for the European species, *genutia* should be considered the type of this genus." This would seem to imply that all the European species were generically distinct from all the American and that the latter should alone be referred to Anthocharis. I do not agree with this statement at all, and I can show grounds for referring American species, with orange blotch in the male, to Euchloe, and for considering that the white species of both continents are slightly more specialized and might be kept under the separate title of Anthocharis. I regret not to have *genutia* to examine and I use Anthomust rather be relegated to a distinct line, running parallel with the Libytheidæ and leading to the main stem of the Hesperiades. Its affinity with the Pieridæ is marked by the position of iv_1, which, on secondaries, has left the upper angle of cell and is fused with the radius to a point much beyond the median cell, as in the Pierinæ. Since there is a parallelism in the specialization between the Lycænid group and the Pieridæ in the reduction of the radial branches, a further parallelism might be made to account for this, especially as on primaries vein iv_1 is fused with radius as in the Theclinæ. But this will not explain the position of vein iii_6 on external margin, the radial position of iv_2 and the more unequal spacing. We might appeal to the imperfection of the geological record and conjure up extinct and intermediate series; but, independent of the fact that such flights of the imagination would lead us nowhere and would excuse even the arrangements proposed by Mr. Meyrick, we cannot do away with the main difficulty, that the wing of Nemeobius is developed upon the Pieri-Nymphalid pattern and that we should not logically graft it upon the Lycæni-Hesperid. The radius is also generalized, five-branched and cannot be derived from a three to four-branched group, which it should have preceded. But the five-branched Hesperiadæ are formed upon another pattern and could hardly have given rise to Nemeobius. The five-branched Hesperiadæ have most plainly produced the three to four-branched Riodinidæ and Lycænidæ. The wing of the latter is just what we might expect from a reduction of the radial branches of Hesperia. The conclusion we may come to is, that we should seek for the origin of Nemeobius in an independent line, and that the structure of the fore feet has been probably independently acquired. There is no difficulty in this, since aborted fore feet are also characteristic of certain moths belonging to the Hypeninæ, notably of *Pallachira bivittata* Grt. There seems to be a latent tendency in this direction which has broken out strongly in the day butterflies.

GENERAL COMPARISONS.

Before entering upon any comparison as to the amount of specialization in the Pieridæ and the "brush-footed" butterflies (=Nymphalidæ of Scudder and Comstock) it will be well to get a mental picture of the neuration of the Pieri-Nymphalidæ as a whole. This can best be obtained by contrasting it with that of an allied wing group in the same structural series, the Lycæni-Hesperidæ. Independent of relative breadth or shape of wing we have in the latter a simpler pattern, the veins more equidistant, an indisposition to fuse and furcate shown by the retention of a central position by vein iv_2; so that as the suppression of the media takes its course this branch tends to degeneration *in situ*, from resisting the attraction of either radius or cubitus. As opposed to this we have a willingness in the Pieri-Nymphalidæ to preserve vein iv_2, which latter tends everywhere to become radial, except in the isolated case of Leptidia, where it becomes cubital. We have a spreading of the veins and abundant traces of unequal specialization. Except in the lycænid reduction of the radial branches, the Lycæni-Hesperiadæ offer few neurational changes to aid our formation of classificatory categories; the Pieri-Nymphalidæ plenty. United by the presence of the looping vein viii, or its traces unequally expressed and sometimes quite vanished, the Hesperiades offer in this way two groups characterized by the peculiar neurational wing pattern; giving us also an instance of parallelism in specialization, in that the Pieridæ sustain an analogous position with regard to the "brush-footed" butterflies (Nymphalidæ, etc.), to that the Riodinid-Lycænids show with respect to the Hesperids or "Skippers." In both these groups the reduction of the radius takes place; the Pierids still showing phases embracing and intermediate between the five and three-branched radius, while no five-branched Lycænid is yet known to me. Thus the gap in the Lycæni-Hesperiadæ between the subgroups is greater than that between the subgroups of the Pieri-Nymphalidæ. But the fact that the reduction of the radial branches has been independently taken up by the two main wing groups of the Hesperiades comes clearly out. I have been unable to find any characters which will always distinguish the neuration of the Hesperiades from the moths. Not so with the Parnassi-Papilionidæ, a distinct major division entirely left out of sight in the present studies.

Having thus endeavored to trace the outlines of the neuration of the Pieri-Nymphalidæ as a whole and to enable the reader to grasp more or less fully the wing structure of this waste of butterflies, we may more in detail compare the wings of the "Whites" with those of the other butterflies in their group. That the radius is specialized in the Pieridæ and generalized in all the other families is the first and obvious difference, one which strikingly throws the balance of specialization to the side of the "Whites." So that in this direction of secondary specialization, which the Pieridæ share with the Parnassiinæ, the Riodini-Lycænidæ, as well as the Saturniades among the moths, the "brush-footed" butterflies (Nymphalidæ of Scudder and Comstock) as well as the Nemeobiidæ have no share and are *hors de concurs*.

We now come to the direction of the suppression of the media. Herein the Pieridæ lag behind the Nymphalidæ (*in sensu mihi*) with one remarkable exception in the position of vein iv_1, the upper branch of the media, which ascends the radius (iii_6) to a point beyond the cell, a character repeated only on the hind wings of Nemeobius. In all the "brush-footed" butterflies this vein never leaves the cross-vein at the extreme upper corner of the median cell. Though the latter open and the disappearance of the media by the distribution of its branches between radius and cubitus become complete, still vein iv_1 never fuses directly with the radius. Did it do so its passage to a point beyond the cell in the process of specialization might be logically expected to follow. What power is it which keeps this vein apart, even in Nymphalis and Potamis, where, in the latter especially, the approximation is carried out so completely? Undoubtedly all these retained and abandoned positions for the veins indicate the action of the dynamical force which fits the wing for variations in the mode of flight. The field observations which are compared with the structure of the wings are as yet scanty in the extreme. I have only brought the opening of the cell and the radial position of iv_2 into a probable relation with a lofty and sailing flight, a tree life like that led by *Potamis iris* or *Philosamia cynthia*. The passage of iv_1 along iii_6 does not seem to help the wing to extended flights. We find it again in the moths, in the Smerinthinæ and Citheroniadæ. The bunching of the two upper branches of the media near the radius at this point seems, on the other hand, to strengthen the primaries. As these veins are retired from the radius and retain their original generalized position on the cross-vein, closing the cell, so does a more modest terrestrial habit of flight seem to prevail; so that it seems probable that the Lepidoptera were not originally high flyers, and that those which now disport among the tree tops are the latest arrivals on their respective and differing lines of phylogenetic descent.

To return to our immediate subject, the comparison of the specializations of the Pieridæ and Nymphalidæ proper. So far as the suppression of the media is concerned, the advantage of the Nymphalidæ is quite clear when the most specialized forms are compared, but even when we descend to the "Fritillaries," where the cell of fore wings closes and vein iv_2 becomes quite central, the superiority is kept up. For everywhere on the hind wings of the Nymphalidæ does the lowest branch of the media, vein iv_3, completely fuse with the cubitus. The cross-vein above it is always very weak, and even vanishes in Araschnia, Melitæa or Euptoieta.

Leaving the two principal directions in which the movable veins show the effects of specialization, we can compare the Pieridæ and Nymphalidæ upon other points. The most important of these is the fusion of ii and iii upon the hind wings at base. Here the Nymphalidæ continue their advantage. In the Nymphalinæ the absorption extends even to the point of issuance of i, and this measure is attained in the most specialized of the Agapetidæ or "Meadow Browns," the Pararginæ. In the mass of the Nymphalidæ this excess is not reached and the point of absorption falls varyingly short. But still it is always carried to a further point than in the Pieridæ, where the union is very brief and apparently quite wanting in Leptidia. This character is plainly secondary and cannot of itself determine the phylogeny. Again, the amount of absorption of i may be compared, a vein which is relatively constant in its position upon ii, from which it issues. It did not always probably do so, for I have observed in Papilio, Zerynthia (=Thais) and Parnassius, the process by which it has come to be fused with ii, and in the present group traces of its independence may be found in the Limnads or "Milk Weed" butterflies. In the Pieridæ this vein i, the so-called "præcostal spur," tends to be absorbed and disappears in Eurymus (Colias) and Colias (Gonepteryx). Here the parallelism in specialization with the "Blues" is continued. But in the Nymphalidæ it appears everywhere to be strong and well-developed; it is here more generalized. Evidently the strong flight continued to call for a strengthening of the shoulder of the secondary wings. In the flutterings of the "Whites," the "Meadow Browns," the "Blues," this need was not so felt and the vein would tend to disappear.

So much we may say in comparing the Pieridæ with the Nymphalidæ proper, and we may pass more quickly over our comparisons of the "Whites" with the remaining families of "brush-footed" butterflies, the "Nymphalidæ" of Scudder and Comstock. After we leave the Pararginæ, the scale of specialization comes to a standstill or turns gradually against the latter. In the Agapetinæ, con-

In all these the little vein iii_{3+4} remains distinct and has not been lost. Evidently Pieris represents the ancestral form of Mancipium and has perhaps been thrown off before the specialization of Pieris has progressed so far. Notwithstanding the similarity of the ornamentation I am not sure that *P. rapæ* is on the direct line of descent. As between *rapæ* and *napi* I incline to consider the latter at present the more specialized. *Aporia cratægi* is evidently a more generalized form, standing a little apart. Vein iii_{3+4} is quite a long furcation, and measures its distance from Pieris. The skeleton of the wing is more powerfully built and vein viii of primaries stronger than in Pieris, in which it seems little better than a scar. The gradation by which this vein, which appears usually like a loop, strap or support to vii at the base, passes into obliteration is so entire that the exact statement of its condition is often difficult either to correctly grasp or record. The "tubular" character disappears by minute gradations; the "scar" aspect and the "tubular" shape are easy to detect, but where the one commences and the other ends it is often hard for me to say. In the holarctic fauna I do not find any form to represent the probably actual five-branched condition of Pieris, but here several types are wanting to me which I should like to have examined. In the genealogical tree of the holarctic butterflies the more generalized Anthocharini must take the place of the common five-branched ancestor of the whole Pierinæ. But this seems to me to stand upon a separate immediate phylogenetic line of its own, notwithstanding some common features of color and marking. With this Anthocharid line we must now in concluding concern ourselves.

Among the Anthocharini, or what we may call the "non-typical Whites," we have, in *Pontia daplidice*, the attainment of the three-branched condition. This butterfly appears to me to have no immediate connection with the "typical Whites," but to be a descendant of Anthocharid ancestry. It is true that Mr. Meyrick refers it without comment to the genus Pieris (*Handbook*, 353), but it is also true that Mr. Meyrick, in the same publication, precedes Pieris by Leptidia (Leucophasia) and this again by Euchloe, and, to make the mixture complete, Gonepteryx (Colias). This sort of work appears to me to prove that Mr. Meyrick's studies are not yet sufficiently "correlated" with the actual facts of structure. If, indeed, the picture which Mr. Meyrick has received of the neuration at all resembles the figures with which his publications are adorned,

no proper judgment could, in my opinion, be formed upon it, and this would perhaps account in part for the seemingly extraordinarily unnatural sequences adopted by him.

The coincidence between the neuration of *Pontia daplidice* and that of *Mancipium brassicæ* is so great, that I am at a loss to give good characters of distinction. But showing, as I do, that the three-branched character of the Pierid primary wing is attained upon obviously distinct lines (*e. g.*, Euremini), this coincidence will not of itself determine the phylogeny. The shape of the wings and the pattern of ornamentation of Pontia are both Anthocharid. It is not conceivable how either could have been derived from Pieris and the "typical Whites." We should have to suppose that the four-branched Pieris threw off the three-branched Mancipium and also the three-branched Pontia; an inference which, considering the want of any near resemblance in the shape and pattern of the wings between the two descendants, or between one of these (Pontia) and the supposed parent stem, must be set down as untenable. More than this, we have in Pontia a similar secondary sexual character in the shape and extent of the wings to that we find in the Anthocharini, no trace of which is evident in Pieris or Mancipium. This character has evidently been retained by Pontia, through an ancestry of which I find one existing representative form, extending back to the five-branched representative of a remote phase which is brought before us now in Anthocharis and Euchloe. I believe that these facts show, that the phylogenetic position heretofore assigned to Pontia, is a discordant one and should be corrected. We may now leave Pontia and look over the more generalized and the typical Anthocharini with their five-branched radius.

Mr. Scudder (*Historical Sketch*, 113) says, regarding the use of the generic term Anthocharis: "As Euchloe must be used for the European species, *genutia* should be considered the type of this genus." This would seem to imply that all the European species were generically distinct from all the American and that the latter should alone be referred to Anthocharis. I do not agree with this statement at all, and I can show grounds for referring American species, with orange blotch in the male, to Euchloe, and for considering that the white species of both continents are slightly more specialized and might be kept under the separate title of Anthocharis. I regret not to have *genutia* to examine and I use Antho-

In all these the little vein iii_{3+4} remains distinct and has not been lost. Evidently Pieris represents the ancestral form of Mancipium and has perhaps been thrown off before the specialization of Pieris has progressed so far. Notwithstanding the similarity of the ornamentation I am not sure that *P. rapæ* is on the direct line of descent. As between *rapæ* and *napi* I incline to consider the latter at present the more specialized. *Aporia cratægi* is evidently a more generalized form, standing a little apart. Vein iii_{3+4} is quite a long furcation, and measures its distance from Pieris. The skeleton of the wing is more powerfully built and vein viii of primaries stronger than in Pieris, in which it seems little better than a scar. The gradation by which this vein, which appears usually like a loop, strap or support to vii at the base, passes into obliteration is so entire that the exact statement of its condition is often difficult either to correctly grasp or record. The "tubular" character disappears by minute gradations; the "scar" aspect and the "tubular" shape are easy to detect, but where the one commences and the other ends it is often hard for me to say. In the holarctic fauna I do not find any form to represent the probably actual five-branched condition of Pieris, but here several types are wanting to me which I should like to have examined. In the genealogical tree of the holarctic butterflies the more generalized Anthocharini must take the place of the common five-branched ancestor of the whole Pierinæ. But this seems to me to stand upon a separate immediate phylogenetic line of its own, notwithstanding some common features of color and marking. With this Anthocharid line we must now in concluding concern ourselves.

Among the Anthocharini, or what we may call the "non-typical Whites," we have, in *Pontia daplidice*, the attainment of the three-branched condition. This butterfly appears to me to have no immediate connection with the "typical Whites," but to be a descendant of Anthocharid ancestry. It is true that Mr. Meyrick refers it without comment to the genus Pieris (*Handbook*, 353), but it is also true that Mr. Meyrick, in the same publication, precedes Pieris by Leptidia (Leucophasia) and this again by Euchloe, and, to make the mixture complete, Gonepteryx (Colias). This sort of work appears to me to prove that Mr. Meyrick's studies are not yet sufficiently "correlated" with the actual facts of structure. If, indeed, the picture which Mr. Meyrick has received of the neuration at all resembles the figures with which his publications are adorned,

no proper judgment could, in my opinion, be formed upon it, and this would perhaps account in part for the seemingly extraordinarily unnatural sequences adopted by him.

The coincidence between the neuration of *Pontia daplidice* and that of *Mancipium brassicæ* is so great, that I am at a loss to give good characters of distinction. But showing, as I do, that the three-branched character of the Pierid primary wing is attained upon obviously distinct lines (*e. g.*, Euremini), this coincidence will not of itself determine the phylogeny. The shape of the wings and the pattern of ornamentation of Pontia are both Anthocharid. It is not conceivable how either could have been derived from Pieris and the "typical Whites." We should have to suppose that the four-branched Pieris threw off the three-branched Mancipium and also the three-branched Pontia; an inference which, considering the want of any near resemblance in the shape and pattern of the wings between the two descendants, or between one of these (Pontia) and the supposed parent stem, must be set down as untenable. More than this, we have in Pontia a similar secondary sexual character in the shape and extent of the wings to that we find in the Anthocharini, no trace of which is evident in Pieris or Mancipium. This character has evidently been retained by Pontia, through an ancestry of which I find one existing representative form, extending back to the five-branched representative of a remote phase which is brought before us now in Anthocharis and Euchloe. I believe that these facts show, that the phylogenetic position heretofore assigned to Pontia, is a discordant one and should be corrected. We may now leave Pontia and look over the more generalized and the typical Anthocharini with their five-branched radius.

Mr. Scudder (*Historical Sketch*, 113) says, regarding the use of the generic term Anthocharis: "As Euchloe must be used for the European species, *genutia* should be considered the type of this genus." This would seem to imply that all the European species were generically distinct from all the American and that the latter should alone be referred to Anthocharis. I do not agree with this statement at all, and I can show grounds for referring American species, with orange blotch in the male, to Euchloe, and for considering that the white species of both continents are slightly more specialized and might be kept under the separate title of Anthocharis. I regret not to have *genutia* to examine and I use Anthocharis for the type *belemia*, which is, perhaps, identical. The subjective question of whether there are two "genera" to be considered is not of any importance to me at all. I recognize two five-branched types: the one specialized, which I seem warranted in calling Anthocharis under Boisduval's original use of that term; the other, relatively generalized, which I call Euchloe, with the type given by Mr. Scudder of *cardamines*.

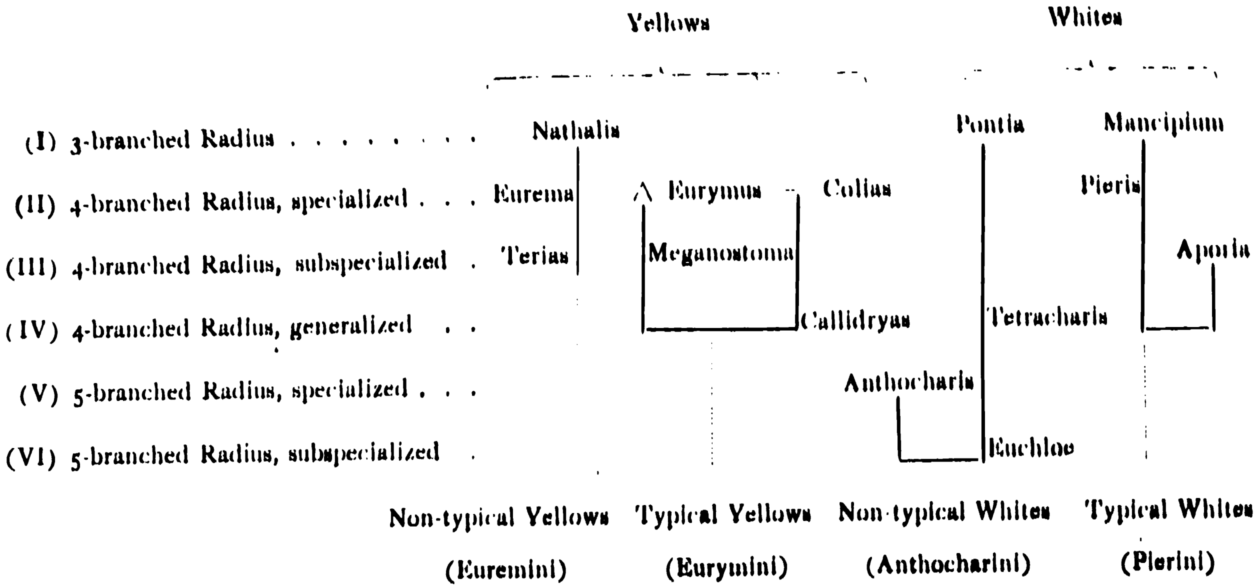
The white Anthocharids differ from the type of *Euchloe cardamines* in that vein iii$_2$ has moved from the original position and is given off opposite, or even beyond the cross-vein. In *A. ausonides*, which is slightly the more specialized of the three examined, it has even passed the extremity of the cell for a considerable distance. Therefore the specialization runs here upon the same line as in the case of Meganostoma and Eurymus. The generic title Anthocharis should have, I believe, the type *belemia*, in case *genutia* does not share these essential characters and is not, in the sense here proposed, an Anthocharis. It is clear from the above citation from the *Historical Sketch*, that Mr. Scudder has misapprehended the state of affairs in this group; for I am quite unable to find any neurational differences between the North American *E. stella* and the European type of Euchloe. In both insects vein iii$_2$ retains its original position above the cell. And the chances seem to be that this will be the case with most of the species, carrying an orange blotch on the male primary, irrespective of locality. In any case, that which interests us here especially is the development of a specializing movement tending generally in the direction of a reduction in the number of the radial branches, but here taking a special and, looking through the day butterflies, perhaps an unusual direction. I find it, besides in these two instances, in the Pieridæ, in Euptoieta, Melitæa, Euphydryas, Araschnia and Heliconius. But when we examine Pontia, we find that, although the five-branched radius has become a three-branched, still vein iii$_2$ has not changed its place. The reduction has been effected by other means than the shifting of iii$_2$ in the direction of the apex of the wing. Into the details of the physiological process of absorption I cannot now enter, sufficient for my present purpose is the fact, that Pontia represents a clean descent from Euchloe-like forms and that it has not passed through Anthocharid-like forms upon its way. The absorption of iii$_4$ has proceeded to a varying extent in these species of Anthocharis. The little branch remaining has become very short indeed in *A. ausonides*. *A. belemia* would be the most generalized form, since iii_2 has not, or hardly, passed the cross-vein. In both *belia* and *ausonides* this halting place has been passed by. But in *Tetracharis* (n. g.) *cethura* Feld., sp., we have a four-branched Euchloe; one which represents an intermediate stage between the five-branched Euchloe and the three-branched Pontia. Tetracharis may be represented also by other species, since I have not been able to examine all the forms of the Anthocharini.

This survey of the Pierinæ has shown us that the Anthocharini represent the most generalized forms apparently in the holarctic fauna, and that they are probably the survivors, not on the direct line, of a former five-branched condition of the family. There remains one more five-branched form to examine: Leptidia (Leucophasia), but this presents so strange a neurational pattern, that it must have come into its present company by a vastly different route. Of its peculiar type it may be a specialized form, although, in comparison with the Pierinæ, it seems generalized. Its white color has come to it, I think, subsequently; as to its origin—*unde et quomodo*—I have no idea which is not imaginary.

To touch finally another aspect of our subject—a study of the dynamics of the butterfly wing has been somewhat neglected. From the details of the changes in the position of the veins, it may be concluded that the movements have a mechanical cause. Since this inquiry belongs to a department of direct observation upon which we can obtain absolute knowledge, without employing reconstructive methods, it may be painfully followed up, in field and cabinet, until the subject becomes clear. The butterflies certainly owe a part of their attractiveness to the fact of their seasonal appearance. They recur at a certain niveau in the biological circle, thus relieving the mind through their plain testimony from doubting that the principle of existence is succession.

TABLE OF PROBABLE TERMINAL PHYLOGENETIC LINES IN THE HOLARCTIC PIERINÆ.

(The differences in specialization are relative and unequal.)


Yellows
Whites
(I) 3-branched Radius . . . .
(II) 4-branched Radius, specialized . . .
(III) 4-branched Radius, subspecialized .
(IV) 4-branched Radius, generalized . .
(V) 5-branched Radius, specialized . . .
(VI) 5-branched Radius, subspecialized .
Nathalis
Eurema
Terias
Eurymus
Colias
Meganostoma
Callidryas
Pontia
Tetracharis
Anthocharis
Euchloe
Mancipium
Pieris
Aporia
Non-typical Yellows
(Euremini)
Typical Yellows
(Eurymini)
Non-typical Whites
(Anthocharini)
Typical Whites
(Pierini)

THE CHARAXINÆ.

The Nymphalidæ proper appear dichotomous. The main ascending branch is represented by the Argynninæ, running up into the Nymphalinæ. This branch is characterized by a short furcation of iii_4 with iii_5, and the genera may be called the "short forks." The second branch represents an earlier condition of the Nymphalids in which this furcation is more or less extended and the genera may be known as "long forks." Just as the passage from the Argynninæ to the Nymphalinæ by the continued greater absorption of ii and iii of hind wings may be considered to have gradually occurred, so the transformation of the "long forks" into "short forks" is inevitable by the progress of iii_4 toward the outer margin of the wing. But, other characters considered, the existing "long forks" seem to hold together on a distinct phylogenetic line. In Anæa we have an existing "long fork" which has lost its taxonomic character in this direction. In Euschatzia (type *morvus*) we have an allied Charaxid which still retains the character. Mr. Scudder having in 1875 (*l. c.*, 111) fixed the type of Anæa as *troglodyta*, this action could not be properly subverted by Schatz, who subsequently made the same species the type of his genus "Pyrrhandra," which name must fall. For *morvus*, more generalized than the species of Anæa, I choose the generic name *Euschatzia*. Genera like Aganisthos, Kallima and Anæa appear to represent in succession Consul, Charaxes, Hypna, Prepona, typical "long forks."

In Charaxes veins iii_4 and iii_5 fuse at base for a short space, only about one-sixth of the length of iii_5. If this short fusion were absent we should have a wing agreeing so far with that of Hesperia, that all the veins are separate, and no furcation, consequent upon the absorption of iii_4 by iii_5, has taken place. Thus in the primitive Nymphalidæ, represented more nearly by the Charaxinæ, the veins were probably all separate. And probably also in the whole group Hesperiades. In fact the hypothesis suggests itself that the lepidopterous wing may have originally shown a series of longitudinal and independent veins, connected by a system of cross veins and without furcations. The disappearance of the cross veins would allow of the contact of the longitudinal veins. This state of affairs would in turn lead to their partial absorption and consequent furcation. We may have in the Hesperiadæ and Tortricidæ existing stages of this evolutionary change in the lepidopterous wing.

To resume: Butterflies like Athyma and even Adelpha seem to find their natural place in the Nymphalinæ. But, when we come to the west coast of South America, we find in Megalura a form which shares the taxonomic character of the secondaries with the Nymphalinæ, while iii_4 of primaries reaches apex. Perhaps here we come upon a fresh phylogenetic line, and the meeting of i, ii and iii of the hind wings at one point is no longer a reliable index of a nearer blood relationship.

A STRANGE AFRICAN PIERID.

A genus which has reached the grade of specialization of Nathalis, Mancipium and Pontia, and even gone beyond it, is represented by the strange little African butterfly *Gonophlebia paradoxa*. In his recent work Mr. Reuter has classified this butterfly as follows: "Papiliones: Pierididæ: Pseudopontiinæ: Pseudopontiidi: Pseudopontia." The major clamp in this declensional series—Papiliones—we can at once discard, since no proof has, nor apparently can ever be offered, that the Whites are phylogenetically connected with the Swallowtails. Further, if we may trust Mr. Scudder, the whole series of etymological changes must go by the board, since Pseudopontia is a synonym of Gonophlebia.

Two common butterflies will help us in understanding the venation of Gonophlebia: *rhamni* and *sinapis*. How the veins may be twisted to sustain the new shape of the wing, here assumed very probably under the influence of mimicry, is certainly taught us by *rhamni*, in which the branches of the radius are bent upward to sustain the expanded costa of primaries. Our strange African butterfly has the veins still more strongly bent out of their normal course to meet the required shape of its funny round wings. In Gonophlebia veins iv_1 and iv_2 have left the cross vein and spring, one following the other, from the main branch of the radius, vein $iii_3 + {}_4 + {}_5$, outside of the closed cell. This is an amplification of the usual Pierine movement of the upper branches of the median system of veins. This, not the whitish color, stamps Gonophlebia as an offshoot of the Pierid stem. Gonophlebia is even more easily recognized as a Pierid than *Leptidia sinapsis*, in which iv_1 has not left the cross vein. But, despite the contrasted shape of their wings, it is not impossible that Leptidia and Gonophlebia are isolated survivors of the same phylum.

The extraordinary movement of the middle branch of the median series, vein iv$_2$, in following the lead of iv$_1$, proves Gonophlebia to be a highly specialized form. The neuration shows us that there is no contradiction offered to the view that Gonophlebia is a specialized Pierid and, in order to make this still plainer, we will study it a little closer.

What gives the pattern of the veining its singularity, and affords a faint reminiscence of the Pericopids, is the tendency to run apart which the veins display in Gonophlebia. The veins are bent more or less out of their usual course, and this is especially the case with v$_2$ on both wings. But all this effort is clearly exerted in order to sustain the circular shape of the wings and keep the thin membrane taut. On the secondaries the expansion of the rounded costal margin has to be performed solely by the radius, in its single specialized condition, without branches. And how is this infrequent task accomplished? The simple vein is bent upwards, near the middle, at a nearly right angle, supporting and anastomosing with vein ii; thence again, less abruptly descending, the radius runs outwardly to external margin below the apices, while vein ii itself is continued to the apex of the wing. Nature wished to make a spherical wing with no greater number of sustaining rods than go to support the longer wings of other butterflies, or even the narrow and extended wings of Leptidia. And thus, with the same economy of material, is the end attained. There arise no new veins, no complexity of machinery astonishes. We have the old veins in new position, but still showing the Pierine movement in specialization.

If Gonophlebia is the pattern of the veining so transformed, it is small wonder that Mr. Butler should deny and Mr. Scudder question its being a butterfly. Added to this the antennæ lack the regulation knob, which would allow Mr. Butler to place it among the "Rhopalocera." A puzzle to the classificators and a seduction to Mr. Reuter to a waste of category, this frail butterfly has evidently suffered many "vicissitudes of the voyage" along the road it has traveled and which may not be so very far now from its ending.

This strange butterfly is the only diurnal I have yet met with in which vein ix is retained on hind wings.

EXPLANATION OF PLATE I.

The figures are obtained by combined photographic process. The veins are numbered according to the system Redtenbacher-Comstock.

iii = radius, iv = media, v = cubitus.

Fig. 1. *Pontia daplidice.* Type of genus. Attention is called to the three-branched radius. A specialized type. Vein iii_2 in original position.

Fig. 2. *Tetracharis cethura.* Type of genus. Compare the four-branched radius with the five-branched radius of Euchloe. Vein iii_2 in original position.

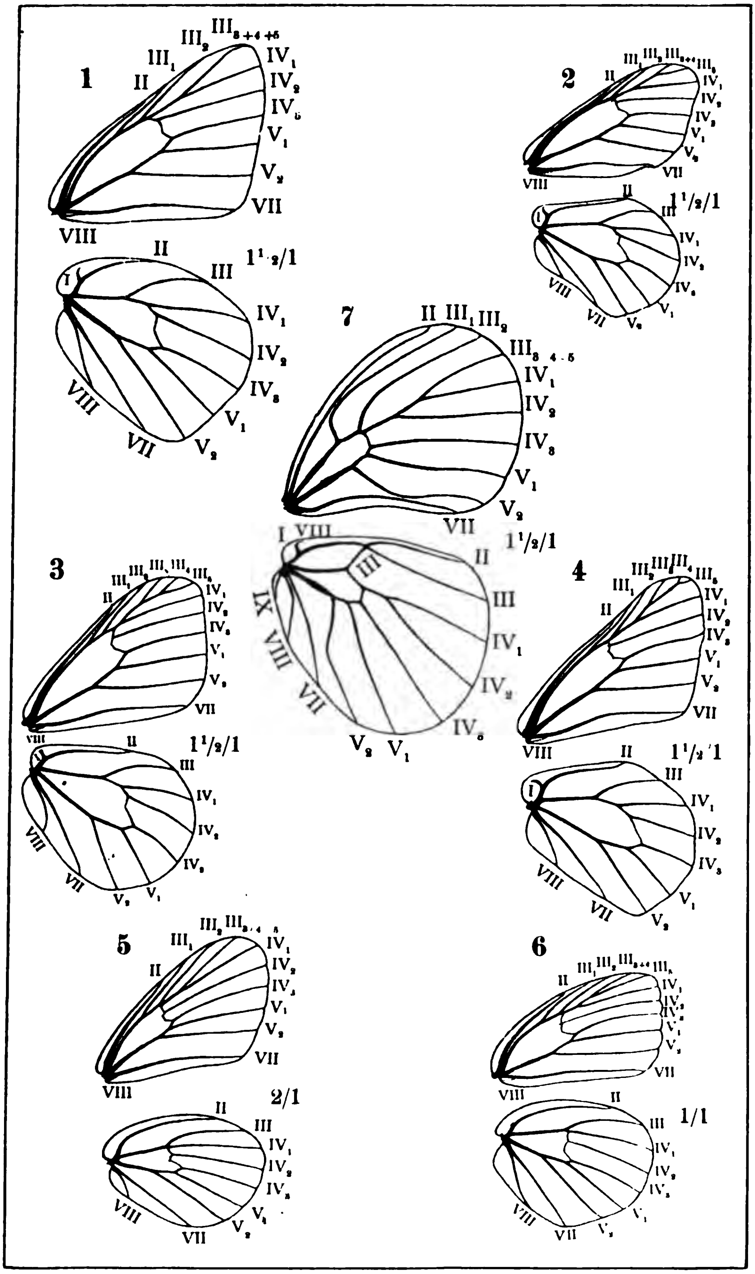
Fig. 3. *Anthocharis ausonides.* Vein iii_2 has moved forward to a point considerably beyond the cross-vein. Attention is called to the diminished extent of vein iii_4. A more specialized form than *A. belemia.* For this type Mr. Scudder uses Synchloe, but contrary to custom. The reason for rejecting Midea for genutia does not seem to me tenable.

Fig. 4. *Euchloe cardamines.* Type of genus. The five-branched radius shows vein iii_2 in original position above the cell. *E. stella* agrees. A generalized type of the group.

Fig. 5. *Nathalis iole.* Type of genus. A specialized type with three-branched radius.

Fig. 6. *Terias hecabe.* Type of genus. A subspecialized type with four-branched radius. Vein viii of primaries fairly distinct. A mere rudiment of vein i of hind wings.

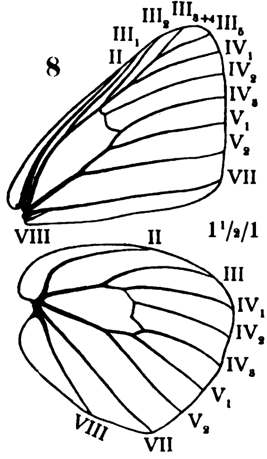
Fig. 7. *Gonophlebia paradoxa.* Type of genus. Vein viii of primaries present, short, close to vii. On secondaries three internal veins. Type of subfamily Gonophlebianue. Compare text.



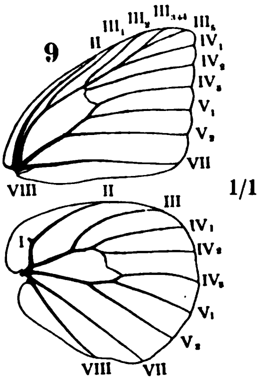
Photolith. F. H. Bödeker, Hildesheim.

A. Radcliffe Grote — Wings of Butterflies.

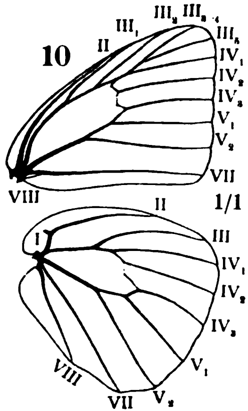
8



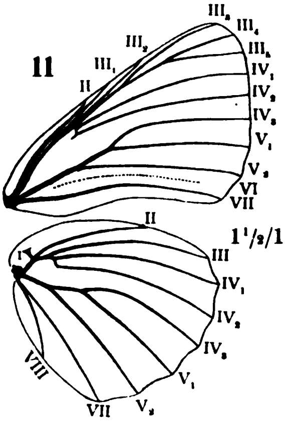
9



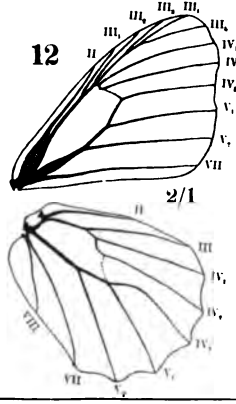
10



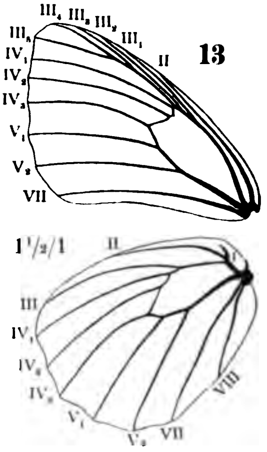
11



12



13



Photolith. F. H. Bödeker, Hildesheim.

A. Radcliffe Grote — Wings of Butterflies.

EXPLANATION OF PLATE II.

The figures are obtained by a combined photographic process. The veins are numbered according to the system Redtenbacher-Comstock.

iii = radius, iv = media, v = cubitus.

Fig. 8. *Eurymus edusa.* Attention is called to the slipping forward of iii$_2$. If a comparison is made with my figure of *Eurymus hyale* (*l. c.*, Fig. 7) it will be found that in this type of the genus the distance traversed by this vein along radius is slightly greater than in *edusa*, which is so far the more generalized form. A specialized type.

Fig. 9. *Meganostoma cæsonia.* Type of genus. Attention is called to the remains of i on secondary wings. On primary wing vein iii$_2$ halts opposite cross-vein. A subspecialized type on the direct line to Eurymus. Mr. Scudder prefers zerene for this genus.

Fig. 10. *Callidryas eubule.* Type of genus. A generalized four-branched type. Vein iii$_2$ in original position.

Fig. 11. *Nymphalis lucilla.* Type of family, subfamily and genus. Vein iii$_4$ given off upon external margin. Attention is called to the generalized state of the radius, common to all brush-footed butterflies. Also to the specialized condition of the median branches, which have joined the radial and cubital systems respectively. The cross-vein has vanished and the media, as a system, has virtually disappeared from the wing. Veins ii and iii on hind wings absorbed to point of issue of i.

Fig. 12. *Pararge ægeria.* Type of genus and subfamily. Attention is called to position of cross-vein on hind wings and to the fact that iv$_3$ has joined cubitus. Compare with the following figure in this respect.

Fig. 13. *Agapetes galathea* ♀. Type of genus, subfamily and family. A more generalized type than the preceding. The lower branch of media, vein iv$_3$, arises from cross-vein and is not permanently joined to the cubital system.

EXPLANATION OF PLATE III.

The figures are obtained by combined photographic process. The veins are numbered according to the system Redtenbacher-Comstock.

iii = radius, iv = media, v = cubitus.

Fig. 14. *Oeneis norna.* Type of genus. Attention is directed to the fact that this is a more generalized form, belonging to the Agapetinæ with iv_2 from cross-vein, by the strongly closed cell and equidistance of the branches. The position assigned by Mr. Scudder, "at the head" of the brush-footed butterflies, cannot be a proper one. The genus seems related to Erebia (*l. c.*, Fig. 23).

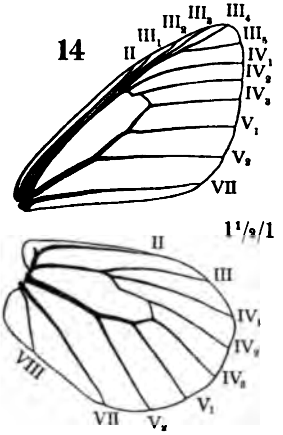
Fig. 15. *Heliconius antiochus.* Type of genus and family. From its total characters a more generalized type than that of the Agapetidæ.

Fig. 16. *Limnas chrysippus.* Type of genus and family. Still more generalized. Attention is drawn to the strong condition of vein viii on fore wings.

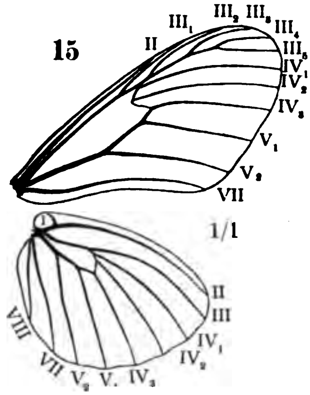
Fig. 17. *Libythea celtis.* Type of genus and family. Outline of wings resembling Polygonia. Vein viii of primaries strong and position of iv_2 nearly central. In other characters specialized. ii and iii on hind wings fused to issue of i.

Fig. 18. *Euschatzia morvus.* Type of genus. The radial branches have intersected with subcosta. A long fork; furcation of iii_4 and iii_5 long, but shorter than in Charaxes. Compare text.

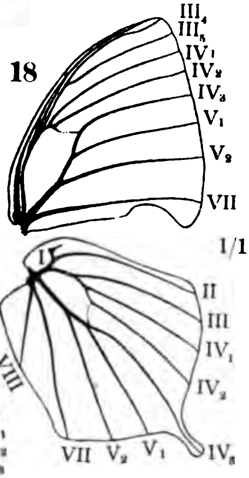
14



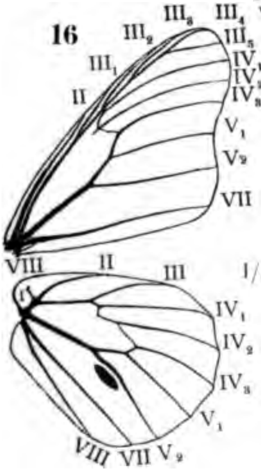
15



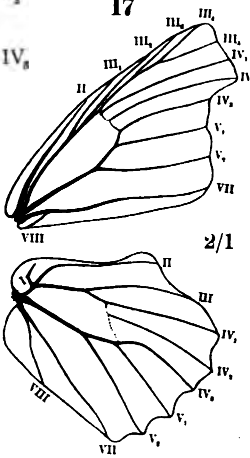
18



16



17



Photolith. F. H. Bödeker, Hildesheim.

A. Radcliffe Grote — Wings of Butterflies.

AN OLD BROADSIDE, WITH A REFERENCE TO THE THRONE OF CONGRESS.

(Plate IV.)

BY JULIUS F. SACHSE.

(Read January 21, 1898.)

A short time ago our efficient Librarian, Dr. I. Minis Hays, during his investigations among the miscellaneous property of the Society, discovered a bundle of old papers which bore the legend, "Of not much value." Upon opening the parcel almost the first paper examined proved to be a small German broadside over a century old. It was printed upon what is known as a quarto sheet, measuring seven by nine inches; it was without date or imprint, and the title simply told that it was a description of a silk serviette or handkerchief. Certainly not one to attract any special attention. Closer examination, however, showed that this advertisement or broadside was really the description of a fine specimen of the weaver's art, executed in silk damask or brocade, which had been made and distributed either in France or Germany, or perhaps in both countries, during the darkest days of the American struggle for freedom, with the express purpose of furthering America's interests in her battle for liberty.

The whole design appears to have been elaborate and symbolical, in which the portrait of Benjamin Franklin, Minister to the Court of France and President of the American Philosophical Society, occupied the most prominent position.

Diligent inquiry among scholars well versed in Revolutionary matters, both historical and pictorial, has failed in bringing to light any other notice of either the broadside or the allegorical handkerchief which was the basis for its publication; and it is but fair to assume that the printed sheet now brought to your notice, to say the least, is unique. The date of the making of our serviette, as it appears from the incidents and inscriptions woven in the fabric, must have been during the summer of 1778, evidently but a short time after the news of the British evacuation of Philadelphia reached the continent.

Another peculiarity of it is that it is couched in that peculiar kind of German, largely interspersed with French words and sentences, which was prevalent in Germany at the period, when every petty princeling in that divided country aimed to maintain a court patterned after that of Louis XV of France.

We now come to the description of this symbolical relic as set forth in the broadside, and it is the fervent wish of the writer that this paper may be the means of bringing to light, or at least locating, one of these handkerchiefs of the Revolutionary period, should one have survived.

From the detailed description it appears that the handkerchief or serviette was of silk. In the centre was a rattlesnake, divided into thirteen parts, whereof the last part or tail end was supposed to be in a state of accretion, a prophetic allusion since realized. This symbol referred to the thirteen American Colonies then struggling for independence. It was patterned after one which appeared in Franklin's *Pennsylvania Gazette* as early as 1754, when he printed in his paper the cut of a severed snake and the motto, "Unite or Die," to show the necessity of Colonial union against the French and Indians. In 1775 this emblem was printed at the head of the *Pennsylvania Journal*, and the idea of the resemblance between the Colonies and the rattlesnake was often brought up in the literature of the day.

The name of one of the different Colonies appeared over each segment. The broadside further goes on to state that this peculiar reptile was chosen as the symbol of the new nation because it was held to be the noblest of its genus: it never strikes without first giving due warning to its enemies, and for this reason, says the broadside, it has been emblazoned upon the arms and flags of the American Provinces. The word *Provinces* evidently refers to such provincial flags as bore a rattlesnake upon their folds. The most noted one of this series was the celebrated flag of Paul Jones, with its warning motto, "Don't Tread on Me."

Within the circle formed upon the handkerchief by the segments of a divided rattlesnake was portrayed a large globe upon a pedestal, so turned as to show North America. Within the outlines of the continent was prominently displayed a portrait of Benjamin Franklin, Ambassador at the Court of France, beneath which appeared the legend, "The Wonder of Our Times." Above this portrait appeared the throne of Congress, together with the Book of the Law and a drawn sword, symbolizing the supreme power. Upon the pages of this book were inscribed, *Les Treize Provinces Unies*

(The Thirteen United Provinces) and *Indépendance le 4 Juillet, 1776* (Independence, July 4, 1776). In the foreground appeared a palmetto tree, upon both sides of which were placed the flags of France, to indicate the treaty so lately negotiated with that country.

A wreath of laurel formed the outside border of the handkerchief, to signify the reward of bravery. The four corners were interlaced with the lilies of France, which the broadside informs us also formed a part of the arms of the United Colonies. Here again we have an allusion to at least one of the many flags carried during the early part of the Revolution, prior to the adoption of the Stars and Stripes.

As corner-pieces there appear to have been four allegorical designs, whose chief *motive* were leading commanders in the armies of the United Colonies. The different Generals were supported by the goddess Minerva and surrounded by trophies of war and figures representing Prudence, Courage and Strength.

In the first medallion we have Washington; upon his left the god Mars who, with his sword, strikes off the shackles from a slave and announces to him emancipation, while he crushed under foot slavery and envy.

Upon Washington's right was Minerva, extending toward him a wreath of oak as an emblem of strength. Genius reclines at her feet and proclaims peace. The legend over this medallion, *Général Washington Il a peu d' Égaux en Bravoure, Prudence et dans l' Art Militaire,* informs the world that General Washington has but few equals in courage, prudence and the military art.

The second medallion shows a portrait of General Charles Lee. At his side are divers American prisoners of war bewailing their fate, and, pointing to the British arms, they implore Mars for succor. General Lee's late career is indicated by a dungeon upon whose walls are exhibited his arms, accoutrements and chains. The accompanying legend, *Général Lee, Tantot Vainqueur Tantot Vaincu,* signifies, "Betimes Conqueror, betimes Conquered."

The third medallion contains a profile of General Richard Montgomery. It is flanked by Sorrow, who points to an urn containing the ashes of the patriot. Below the portrait are seen a coffin and a monument. A mourning genius, with torch reversed, beside the cenotaph, represents death. Mars consoles him by pointing with his sword to a battle scene in the distance. The allegory is explained by the legend, *General Montgommery,* [*sic*] *Thou do'st fall, but Freedom shall build her Throne on thy Grave.*

The central figure of the fourth medallion is General Gates, supported by Wisdom and Liberty, whereof the latter points with Mercury's wand toward the naval and military forces of the United Provinces. The fertility and affluence of our country are indicated by a scene on the river Nile. Above all appears the legend, *General Gates, Vainqueur de ses Ennemis* (General Gates, Vanquisher of his Enemies).

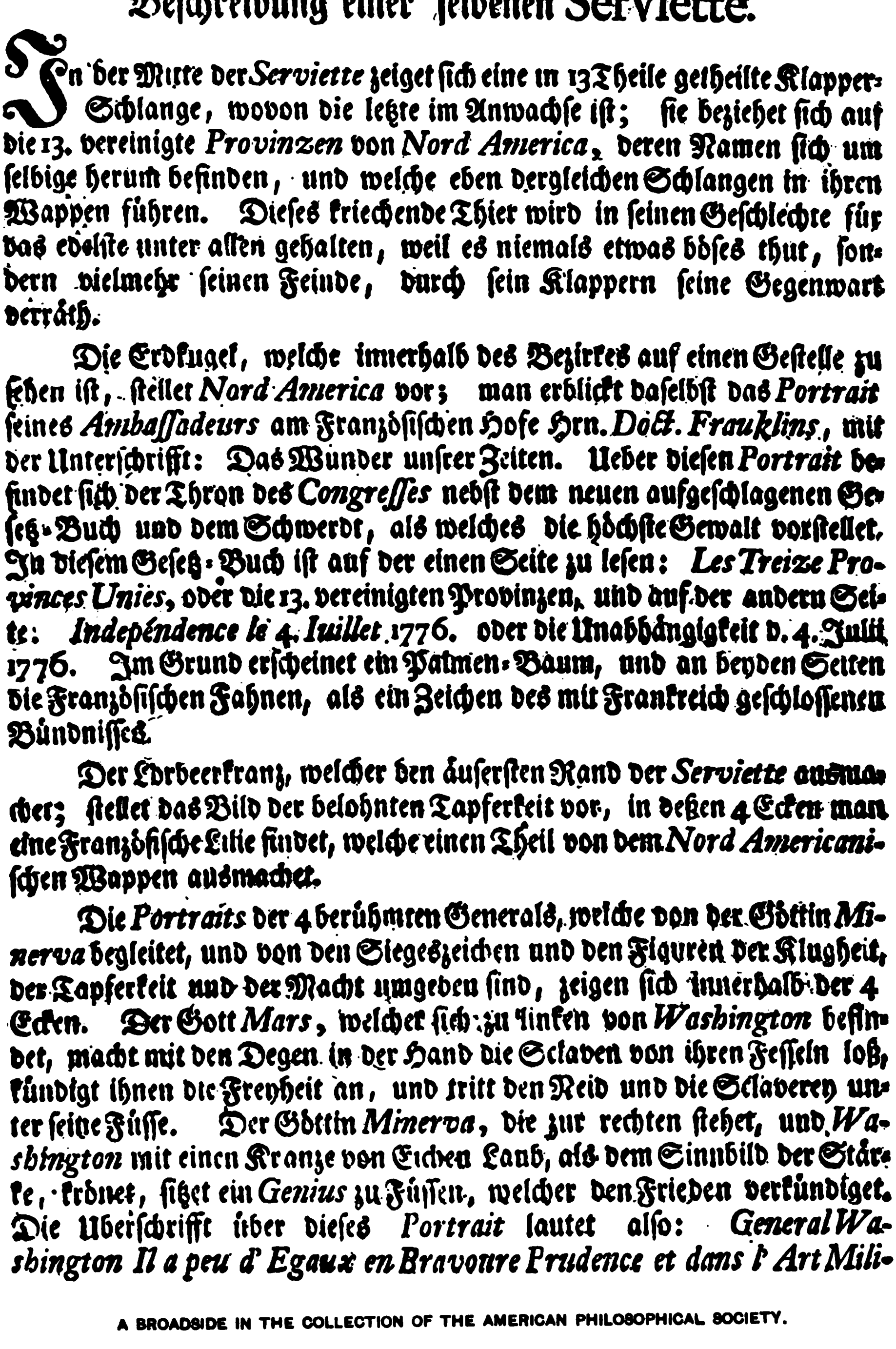
In connection with these four medallions there remain to be noticed four battle scenes ingeniously wrought into the fabric.

1. The battle of Quebec, where General Montgomery was killed. (*La Bataille devant Québeck, où le Général Montgommery fut tué.*)
2. The battle of Trenton, where the Hessian troops were defeated December 25, 1776. Curiously enough our broadside gives the credit for the victory to General Lee: *La Bataille de Trentvice, où les Hessois furent défaits par le Général Leé, le 26 Decembre, 1776.*
3. The battle of Saratoga, October 17, 1777, showing the surrender of Lord Burgoyne to General Gates. The legend reads: *La Bataille de Saratoga, le 17 d' October, 1777, dans laquelle le Général Bourgoyne fut fait Prisonnier par le Général Gates.*
4. The retreat of the British from Philadelphia by way of the Jerseys June, 1778. With the inscription: *Les Trouppes Angloises se retirent de Philadelphia à Jerseys l' an 1768* [*sic*].

Finally, there is shown a horizon with forked lightning, from which descend two crowns, each formed of thirteen parts, one divided, the other united; emblematical of the dependence and independence of the North American Colonies.

From the above description it will be seen that this specimen of the textile art was one of no mean order, either in its poetical conception or the artistic execution. It further brings to our knowledge a heretofore unknown means used to interest foreign people of the better classes in our favor during what may well be called the critical time of our revolutionary struggle.

Historically, our old broadside is of the greatest importance in one particular, especially so at this time, when the old State House and Independence Hall are undergoing another siege of "restoration;" our broadside gives us a definite clue to a representation of a hitherto forgotten or overlooked accessory to the furnishings of the east room of the State House.



Beſchreibung einer ſeidenen Serviette.

In der Mitte der *Serviette* zeiget ſich eine in 13 Theile getheilte Klapper-Schlange, wovon die letzte im Anwachſe iſt; ſie beziehet ſich auf die 13. vereinigte *Provinzen* von *Nord America*, deren Namen ſich um ſelbige herum befinden, und welche eben dergleichen Schlangen in ihren Wappen führen. Dieſes kriechende Thier wird in ſeinen Geſchlechte für das edelſte unter allen gehalten, weil es niemals etwas böſes thut, ſondern vielmehr ſeinen Feinde, durch ſein Klappern ſeine Gegenwart verräth.

Die Erdkugel, welche innerhalb des Bezirkes auf einen Geſtelle zu ſehen iſt, ſtellet *Nord America* vor; man erblickt daſelbſt das *Portrait* ſeines *Ambaſſadeurs* am Franzöſiſchen Hofe Hrn. *Doct. Frauklins*, mit der Unterſchrifft: Das Wunder unſrer Zeiten. Ueber dieſen *Portrait* befindet ſich der Thron des *Congreſſes* nebſt dem neuen aufgeſchlagenen Geſetz-Buch und dem Schwerdt, als welches die höchſte Gewalt vorſtellet. In dieſem Geſetz-Buch iſt auf der einen Seite zu leſen: *Les Treize Provinces Unies*, oder die 13. vereinigten Provinzen, und auf der andern Seite: *Indepéndence le 4. Iuillet* 1776. oder die Unabhängigkeit d. 4. Julii 1776. Im Grund erſcheinet ein Palmen-Baum, und an beyden Seiten die Franzöſiſchen Fahnen, als ein Zeichen des mit Frankreich geſchloſſenen Bündniſſes.

Der Lorbeerkranz, welcher den äuſerſten Rand der *Serviette* ausmachet; ſtellet das Bild der belohnten Tapferkeit vor, in deßen 4 Ecken man eine Franzöſiſche Lilie findet, welche einen Theil von dem *Nord Americaniſchen* Wappen ausmachet.

Die *Portraits* der 4 berühmten Generals, welche von der Göttin *Minerva* begleitet, und von den Siegeszeichen und den Figuren der Klugheit, der Tapferkeit und der Macht umgeben ſind, zeigen ſich innerhalb der 4 Ecken. Der Gott *Mars*, welcher ſich zu linken von *Washington* befindet, macht mit den Degen in der Hand die Sclaven von ihren Feſſeln loß, kündigt ihnen die Freyheit an, und tritt den Neid und die Sclaverey unter ſeine Füſſe. Der Göttin *Minerva*, die zur rechten ſtehet, und *Waſhington* mit einen Kranze von Eichen Laub, als dem Sinnbild der Stärke, krönet, ſitzet ein *Genius* zu Füſſen, welcher den Frieden verkündiget. Die Uberſchrifft über dieſes *Portrait* lautet alſo: *General Waſhington Il a peu d' Egaux en Bravoure Prudence et dans l' Art Mili-*

A BROADSIDE IN THE COLLECTION OF THE AMERICAN PHILOSOPHICAL SOCIETY.

taire; oder das heißt: daß General Washington in der Herzhafftigkeit, Klugheit und Kriegs-Wiſſenſchaft, wenig ſeines gleichen hat.

Das *Portrait* des General *Lee* erinnert uns an ſein Gefängniß, welches durch einen Thurm bezeichnet iſt, woran ſeine Waffen und Rüſtung, wie auch ſeine Ketten angehefftet ſind, mit der Ueberſchrifft: *General Lee, Tantòt Vainqueur Tantòt Vaincù*, das heißt: General Lee, bald Ueberwinder, bald überwunden. Ihm zur Seiten befinden ſich einige Amerikaniſche Gefangene, welche ſein Schickſal beklagen, und *Mars* hierüber zureden, indem ſie nach dem Engliſchen Wappen hinweiſen.

Das *Medaillon* des General *Montgommery* im *Profil*, iſt von der Traurigkeit begleitet, welche auf die Urne hinzeiget, worinn die Aſche dieſes großen Mannes aufbewahret iſt. Ueber ihn folgen die Worte: *General Montgommery Thou do'ſt fall, but Freedom ſhall build her Throne on thy Grave*, oder: du fällſt, aber auf deinen Grabe wird die Freyheit ihr Thron bauen. Unter dem *Medaillon* ſiehet man deſſen Sarg, und zur Seiten deßen Grabmal. Ein dabey ſtehender traurender *Genius* mit einer umgekehrten Fackel, ſtellt den Tod vor; *Mars* tröſtet ihn, indem er auf die daneben ſtehende Schlacht mit dem Schwerdt hinzeiget.

Das *Portrait* des General *Gates*, iſt von der Weisheit und Freyheit umgeben, wovon leztere mit dem Stabe des *Mercurs* auf die See- und Landmacht der vereinigten *Provinzen* hinweiſet. Der Nilfluß zeiget die Fruchtbarkeit und den Ueberfluß des Landes an, mit der Ueberſchrifft: *General Gates, Vainqueur de ſes Eunemis*, oder: der Ueberwinder ſeiner Feinde.

Die auf dieſer *Serviette* gezeichneten 4 Schlachten, ſind annoch zu bemerken:

Erſtens. *La Bataille devant Quebeck où le General Montgommery fût tué*, oder die *Bataille* von Quebeck, woſelbſt der General *Montgommeri* getödtet wurde.

Zweytens, *La Bataille de Trentvice où les Heſſois furent dèfaits par le General Leé le 26 Decembre* 1776. oder die *Bataille* von *Trentown* wo die Heſſen den 26 December 1776 geſchlagen wurden.

Drittens ſiehet man die *Bataille* von *Saratoga*, den 17. October 1777. in welcher General *Bourgoine* durch General *Gates* zum Kriegsgefangenen gemacht wurde, mit der Unterſchrifft: *La Bataille de Saratoga le 17. d' Octobre 1777 dans laquelle le Géneral Bourgoyne fût fait Priſonnier par le General Gates.*

Viertens, die *Retirade* der Engländer aus *Philadelphia* und nach denen *Jerſeys* 1778. mit der Unterſchrifft, *Les Trouppes Angloiſes ſe retirent de Philadelphia d'Jerſeys l' an 1768.*

Endlich erblicket man auch zwey unter einen blitzenden Himmel in 13 Stück getheilte, endlich aber in eins zuſammen gebrachte Kronen, welches die Abhängigkeit und Unabhängigkeit von *Nord America* verſtellet.

I allude to the canopied throne in Independence Hall, a piece of ornamental furniture occupied by the Speaker of the Continental Congress at the time when Independence was declared, and which remained a feature of the historic room until some time after the Revolution.

Nothing can be farther from our idea of the birth of American liberty than the introduction upon the scene of a throne with royal emblazonment. The mere suggestion would seem like a desecration of our most cherished sanctuary, where assembled the noble patriots who declared these Colonies free and independent. It certainly does seem like an incongruity to picture John Hancock, him of the bold signature, descending from a throne or anything that savored of monarchy to affix his autograph to the immortal Declaration.

No painting or engraving, so far as known to the writer, portrays anything like such an accessory to the equipment of the chamber. No artist appears to have had the temerity to give us a true view of the Chamber of Assembly, with its gallery for the public and the ornate trappings over the windows and Speaker's chair. The memorable scene of signing the Declaration is generally depicted as one of extreme republican simplicity, in fact painfully so, giving the generations of the present day the impression that the interior of the State House, the finest public building in the Colonies, was as plain and devoid of ornamentation as a Quaker meeting-house, and in every case, as it now appears, incorrect in most vital detail.

Now, in the face of the accepted pictures of the Chamber of Assembly, or east room of the State House, we here have the statement of a picture of this throne, or, as it is called, "The Throne of Congress," supported by the Book of Laws and the Sword. And this picture appears as described on the handkerchief.

Unsupported by corroborative evidence, this statement would most likely, in the absence of the original, be received as a piece of artistic or poetic license on the part of the artist who sketched the design, and who for purposes of his own inserted a symbol of royalty so distasteful to patriots of all nations.

I will now read a piece of evidence in support of the existence of a throne in the east room. It was written by an eye-witness, the Prince de Broglie, who visited the State House in 1782:

"The State House, where Congress assembles, as does the Council of Pennsylvania, and where also the Courts of Justice are held, is a building literally crushed by a huge massive tower, square and not very solid.

"Congress meets in a large room on the ground floor. The chamber is large, without any other ornament than a bad engraving of Montgomery, one of Washington, and a copy of the Declaration of Independence. It is furnished with thirteen tables, each covered with a green cloth. One of the representatives of each of the thirteen States sits during the session at one of these tables. The President of the Congress has his place in the middle of the hall upon a sort of a throne."

Now the phrase, "sort of a throne," might mean nothing, if coming from a modern American, more than a very dignified seat; but, coming as it does from a French nobleman of the ancient *regime*, it certainly suggests the idea of regal state. The least we can expect from it would be an ornamental chair on a dais surmounted by a canopy and ornamented with the symbols of the home government.

With these facts before us we may well assume that the symbol was an actual and not a typical one, and that it could only have been introduced into the general design by one familiar with the old Council Chamber.

We now come to another phase of the subject; how so elaborate a piece of furniture happened to be a part of the equipment of the Chamber at the time when the Continental Congress took the step which eventually made the Colonies an independent nation. The solution of this problem is comparatively easy. When it is taken into consideration that the room in which Congress met had for years been used by the Assembly of Pennsylvania, and was more or less elaborately equipped with fine furniture and hangings, there can be but little question that ample provision was made for the august Speaker and for the Governor when he was present on State occasions in the shape of an elaborate canopied dais, surmounted by the royal arms and other insignia of monarchical authority.

A somewhat similar arrangement with royal insignia over the seat of the Chief Justice ornamented the west room. The final disposition of these symbols of kingly authority appears in the issue of the *Pennsylvania Journal*, Wednesday, July 10, 1776, where we are told that on the evening of Monday, July 8, the day upon which the Declaration was publicly read, "Our late King's coat of arms was brought from the hall in the State House and burned amidst the acclamations of a crowd of spectators."

A throne with royal arms in Independence Hall! Words could hardly express a greater incongruity. Yet, to be historically correct, the learned Committee who have charge of the restoration of Independence Hall if they wish to place the ancient Chamber in the exact condition it was in on July 4, 1776 (and I believe that is the intention) will certainly have to introduce a canopied dais or throne in the eastern end of Independence Hall.

Another apparent historic incongruity in our old broadside is the legend which gives to General Charles Lee the credit for the capture of the Hessians at Trenton, when, as a matter of fact, that General was then a prisoner of war in the hands of the British. The explanation of this curious statement is that Lee claimed to have sent Washington the necessary information from New York, and formulated the plan of battle which brought about the capture of Rhal's forces. This, it appears, was believed in Europe to have been the case, and the design was evidently made and published before the news of the battle of Monmouth and the subsequent court-martial of Lee reached the continent.

In closing this paper I repeat the wish that its dissemination may bring to light, either at home or abroad, one of these symbolical compositions so curiously wrought in threads of silk and used in the interest of American Independence, the only description of which, so far as known, is the broadside found in the archives of the American Philosophical Society. Further, the finding of one of these serviettes would give to us the true design of the Throne of Congress, which for years was a feature of Independence Hall.

Stated Meeting, February 4, 1898.

Vice-President SELLERS in the Chair.

Present, 12 members.

Acknowledgments of election to membership were received from Profs. C. F. W. McClure and Henry B. Fine.

The Standing Committees for the year, appointed by the President, under resolution of the Society, were announced, as follows:

Finance.—Philip C. Garrett, William V. McKean, Joel Cook.

Hall.—William A. Ingham, Joseph M. Wilson, Horace Jayne.

Publication.—Daniel G. Brinton, Persifor Frazer, I. Minis Hays, Frederick Prime, Samuel P. Sadtler.

Library.—Edwin J. Houston, Frederick Prime, T. Hewson Bache, Albert H. Smyth, Samuel P. Sadtler.

Michaux Legacy.—Thomas Meehan, Angelo Heilprin, William Powell Wilson, Burnet Landreth, Henry Trimble.

Henry M. Phillips Prize Essay Fund.—William V. McKean, Craig Biddle, Joseph C. Fraley, C. Stuart Patterson, Mayer Sulzberger, the President, the Treasurer.

Programme.—William Pepper, Persifor Frazer, William A. Ingham, Joseph C. Fraley, I. Minis Hays.

The death was announced at Philadelphia, on January 29, 1898, of Dr. Theophilus Parvin, aged 69 years.

Prof. W. B. Scott read by title the following papers intended for the *Transactions:* "The Osteology of Eliotherium" and "Notes on the Canidæ of the White River Oligocene."

Prof. W. B. Scott presented a paper on "The Exploration of Patagonia."

Pending nominations Nos. 1432, 1435 and 1445 to 1450 were read.

The Society was adjourned by the presiding officer.

Stated Meeting, February 18, 1898.

Vice-President Sellers in the Chair.

Present, 20 members.

The Special Committee on Prof. Scott's papers, entitled "Notes on the Canidæ of the White River Oligocene" and "The Osteology of Elotherium," recommended their publication in the *Transactions*, which was so ordered.

The Special Committee on Dr. Harrison Allen's papers presented for the *Transactions*, entitled "The Glossophaginæ" and "The Skull and Teeth of the Ectophylla alba," recommended their publication, which was so ordered.

The death was announced of Rev. William C. Cattell, D.D., on February 11, in his seventy-first year.

The President, on motion, appointed Dr. McCook to prepare an obituary notice of Dr. Cattell.

Dr. Carl Lumholtz read a paper on "The Huichol Indians of Mexico and Their Objective Symbols," which was discussed by Dr. Brinton and Mr. Culin.

Pending nominations were read and spoken to, and the Society proceeded to the election of new members, after which the Tellers reported the following persons had been elected members:

2367. Thomas H. Montgomery, Jr., Philadelphia.
2368. W. L. R. Emmet, Schenectady, N. Y.
2369. George H. Darwin, F.R.S., Cambridge, Mass.
2370. S. Dana Greene, Schenectady, N. Y.
2371. L. B. Stillwell, Buffalo, N. Y.
2372. Charles F. Scott, Pittsburgh, Pa.

The Society was adjourned by the presiding officer.

Stated Meeting, March 4, 1898.

Vice-President SELLERS in the Chair.

Present, 9 members.

Mr. T. H. Montgomery, Jr., a newly elected member, was presented and took his seat in the Society.

Letters accepting membership were read from W. L. R. Emmet, Thomas H. Montgomery, Jr., and Percival Lowell.

The death, in his eighty-third year, of Rev. James Legge, D.D., LL.D., of Oxford, England, was announced.

Pending nominations 1432 and 1451 and new nominations 1452 and 1453 were read.

The Society was adjourned by the presiding officer.

Stated Meeting, March 18, 1898.

Dr. I. MINIS HAYS in the Chair.

Present, 11 members.

Acknowledgments of election to membership were read from Charles F. Scott, of Pittsburgh, Pa.; George H. Darwin, of Cambridge, Eng.; S. Dana Greene, of New York, and L. B. Stillwell, of Niagara Falls, N. Y.

Correspondence was submitted and donations to the Library and Cabinet were reported.

Announcement was made of the death of Sir Henry Bessemer, at his residence near London, on March 15, 1898, in the 85th year of his age; and of the Rev. Dr. Edward A. Foggo, at Philadelphia, March 8, 1898, aged 64.

The following communications were presented:

By R. H. Mathews, "Initiation Ceremonies of the Native Tribes of Australia."

By W. B. Scott, "A Preliminary Note on the Selenodont Artiodactyls of the Uinta Formation."

Pending nominations Nos. 1432 and 1451 to 1453 and new nominations Nos. 1454 to 1457 were read.

The Society was adjourned by the presiding member.

INITIATION CEREMONIES OF AUSTRALIAN TRIBES.

(Plate V.)

BY R. H. MATHEWS, L.S.

(*Read March 18, 1898.*)

The Koombanggary tribe, which was at one time both numerous and important, inhabits the country from the south side of the Clarence river along the sea-coast about as far as Nambucca, extending westerly almost to the main dividing range. On the south they are bounded by the Thangatty tribe, occupying the Macleay river. The Anaywan tribe, scattered over the table-land of New South Wales, bound the Thangatty and Koombanggary people on thewest. As no description of the *Būrbūng* of these tribes has yet been published, I have prepared the following brief account of that ceremony as practiced within the district indicated. Their social organization is after the Kamilaroi type, being divided into four sections,[1] with numerous totems consisting of animals, plants and other natural objects.

A *Būrbūng* is held at any time that there are a sufficient number of boys old enough to be installed as tribesmen; and the headman of the tribe, whose turn it is to take the initiative in calling the people together for this purpose, is generally agreed upon at the conclusion of the previous inaugural gathering which took place. When the appointed time comes round, the tribe who are charged with this duty select a suitable camping ground within their own territory, and some of the initiated men commence preparing the ground. While they are employed at this work, the principal headman dispatches messengers to such of the surrounding tribes as he wishes to join in the ceremony. These men are selected from among his own friends and belong to his own totem. Each messenger has generally one or more other men with him to keep him company, and he is provided with the emblems usually carried on such occasions, namely, a bull-roarer, several articles of a man's dress and some native weapons. The conduct of these messengers on their arrival in the proximity of the camp of the people to whom the invitation has been sent is very similar to the procedure previously explained in my descriptions of the initiation ceremonies of other tribes.

The situation of the general encampment as regards water and food supplies, and the location of the visiting tribes around the local mob, are also substantially the same as already stated. In a retired spot, a short distance from the main camp, the headmen have a private meeting place, called the *bunbul*, where they congregate to discuss such matters as they do not wish the women to hear. They have one or more fires around which they sit, and none of the uninitiated men are allowed near them. The women must not intrude upon the *bunbul*, even if the men are not there. The single women and girls also have a place near the camp, but in the opposite direction, where they assemble to work at making nets, headbands and such like. Every aboriginal camp is kept free from excrementitious matter. When the people go out to attend to any necessity of nature, they at once make a hole in the ground and cover the deposit over with earth.

---

[1] I have given the names of the divisions of these people in my paper on "The Totemic Divisions of Australian Tribes," *Journ. Roy. Soc. N. S. Wales*, xxxi, 168–170.

In close proximity to the camp is the *bŭrbŭng* or public ring, bounded by a low earthen embankment, with a narrow sunken pathway called *maro*, leading about four or five hundred yards into the forest to another circular space, formed in the same manner, known as the *eeteemat*, in the floor of which the butts of two saplings are firmly inserted, having the rooty ends upwards. These inverted stumps are called *warringooringa*, and are prepared in the way described in my papers dealing with initiation ceremonies elsewhere.[1] The *maro* enters both the circles through a narrow opening left in the embankment, and the latter is continued outward a few feet along either side of the path where it meets the rings. Within the *eeteemat* there are also sometimes two, and sometimes four, heaps of earth, about a foot and a half or two feet high.

Around the outside of the *eeteemat* and along both sides of the pathway referred to, there are a number of trees marked with the usual *moombeera* devices, as well as the outlines of an iguana, a squirrel, the new moon and other figures, all chopped into the bark with a tomahawk. On one side of the path are some tracks of an emu's foot, cut into the surface of the ground a few feet apart, as if made by that animal running along. These tracks lead away some distance into the adjacent bush, forming a sort of curve or semicircle around the *eeteemat;* and on following them up they are found to terminate at the prone figure of an emu, *ngooroon*, formed by heaping up the loose earth into the required shape. All over the body of the emu thus drawn in high relief small twigs of the oak or wattle tree are closely inserted to represent the feathers of the bird. All the sticks and loose rubbish are scraped off the surface of the ground for several yards around this figure, for the purpose of dancing on.

Approaching the *eeteemat*, near one side of the pathway, there is a low mound of earth about a foot high. This is called *kooroorballunga*, and a fire is lit on top of it during the time that any performance is going on, such as the arrival of a tribe, their daily games and the ceremonial connected with the removal of the novices.

---

[1] "The Bora of the Kamilaroi Tribes," *Journ. Anthrop. Inst.*, xxv, 325.

[2] The fronds or leaves of these trees bear some resemblance to the emu's feathers.

In the vicinity of the marked trees is a gigantic human figure named *Dharroogan* or *Gowang*, lying extended on the ground, composed of the loose soil scraped off the surface for some yards around. A little way farther on, near the *eeteemat*, is the prostrate image of a wallaroo, formed in high relief in the same manner. In building all the earthen figures just described, stones or pieces of wood are first heaped up on the ground, almost to the height of the object required, and on top of this the loose earth is thrown to complete the figure and give it the necessary shape. The finished drawing represents the intended animal in high relief on the surface of the ground.

A rope made of stringy bark is stretched between two of the marked trees which are not too far apart, and about midway along this rope there is a bundle of leaves and finely frayed pieces of soft bark, supposed to represent the rest of a ring-tail opossum.[1]

When a strange tribe reaches a point somewhere within an easy stage of the main camp they paint their bodies with colored clays in accordance with the style customary in their tribe, after which the journey forward is resumed, the men in the lead, with the women and children following. On the approach of the strangers, the men of the local mob, and also the men of previous contingents who have arrived at the main camp, stand outside the *bŭrbŭng* circle with their spears and other weapons in their hands, and sway their bodies to and fro. The new arrivals then march on in single file, in a meandering line, each man carrying his weapons in his hands; they enter the ring and march round and round until they are all within it in a spiral fold. They now come to a stand and jump about, the headman calling out the names of camping grounds, water-holes, shady trees, etc., in their country. After this they come out of the ring and each detachment of the hosts enter it in succession and act in a similar manner. For example, the contingent from Kempsey, who had arrived first, entered the ring and called out the names of remarkable places; next, the contingent from Armidale did likewise; then the contingent from Tabulam, and so on. Lastly, the men of the local Nymboi river mob enter the ring and act in the same way. While this reception is being accorded to the men, the women, novices and children go into the camping ground and take up their quarters on the side nearest their own country.

---

[1] All the animals drawn upon the trees, or on the ground, represent the totems of some of the people assembled at the main camp.

The men of the newly arrived contingent are next taken along the track to the sacred ground, and are shown all the markings in the soil and on the trees, the earthen figures in high relief, and the fire, at each of which they dance and give a shout. They then start along the tracks of the emu, some men being on one side and some on the other, the front men pretending to be following the marks in the ground. They make short grunt-like exclamations as they run along and all the other men follow in a body. On reaching the figure of the emu, they all give a shout and dance round on the clear space before referred to.

They next assemble around the *eeteemat* and are shown the *warrangooringa*, on the roots of each of which an old man is sitting performing magical feats. Some of the headmen enter the ring dancing and singing round the heaps of earth and the *warrangooringa*, after which the two men descend from the latter and join the others. All the wizards or "doctors" take their turn at producing rock-crystals, blood, string and other substances from different parts of their bodies. After each trick, these clever fellows run with their heads down amongst the men who are standing outside the ring, who jump around to get out of their way. At the conclusion of these performances all the men go back along the track, and at about, say fifty yards from the *bŭrbŭng*, they are met by the novices, who join the procession, taking their places with the men of their own sectional division,[1] who enter the ring and dance round a few times, naming remarkable localities in their several districts, their totems, etc., and the women, who are standing around outside, throw handfuls of leaves at them, after which they all disperse to their respective quarters.

A week or two, and in some cases a much longer time, elapses between the arrival of the first contingent and the last mob who have been invited from the surrounding districts, so that the earlier arrivals have a good while to wait at the main camp. During this period carraborus are held almost every fine night, the different tribes present taking their turn at providing the evening's amusement. The men go out hunting every day and the women proceed in search of vegetable food, but there are always some of the old men and women in the camp. Each afternoon when the men return from the hunting or fishing expeditions, which have engaged them during the earlier portion of the day, the men of the local tribe start from the camp and walk away to the *eeteemat*, carrying a boomerang or some other weapon in each hand. They are shortly afterwards followed by the men of the other tribes, each mob starting in the order of their arrival at the main camp. On reaching the ring they look over the *moombeera*, the raised and carved figures on the ground, the *warrangooringa*, etc., and go through practically the same routine—and return to the *bŭrbŭng* in the same manner—as on the arrival of a new tribe. On some days during their visit to the *eeteemat*, the bullroarer is sounded, and the men beat the ground with pieces of bark held in the hand. It may be that a few additional trees are marked on these occasions, or some improvements are made in the earthen figures, or any other extra work which may add to the embellishment of the ground.

---

[1] *Journ. Roy. Soc. N. S. Wales*, xxxi, 169.

As soon as convenient after the arrival of all the tribes who are expected to join in the ceremony the headmen assemble, and after a consultation among themselves they determine the day on which the novices will be taken away for the purpose of initiation. The *Kooringal*, or band of men who are to take charge of the ceremonies in the bush, are selected and the locality fixed where the women are to erect the new camp and wait for the return of the novices. On the morning which has been decided upon for taking the boys away, the whole camp is astir at daylight. The painting of the novices is now proceeded with, all of them being adorned with red ochre and grease from head to foot. Each boy is then invested with a girdle, to which four "tails" or kilts are attached, one hanging down in front, one at each side and one behind. They are then conducted into the *bŭrbŭng* ring and placed sitting down on the raised earthen wall, the boys of each tribe being in a group by themselves on the side of the ring which is nearest their own country. The mother of each novice is then seated outside the embankment a few yards behind where he is sitting; his sisters and the other women are placed on the ground a little farther back. A screen of boughs is erected between each group of mothers and their sons. One or more of the headmen now go along the groups of novices and throw a rug over the head of each boy. All the women and children are told to lie down and keep still, and are covered with rugs, bushes or grass, which have been placed in readiness for the purpose. The women then commence making a low humming or chanting noise, and several old men armed with spears keep watch over them to see that no attempt is made to remove the covering or look about.

When these preliminaries have been completed, two men sound bull-roarers (*yoolooduree* or *yeemboomul*) in close proximity and a few other men come along the path and run round inside the circle beating the ground with pieces of bark, similar to those described in my paper on *The Būrbūng of the Wiradthuri Tribes.*[1] All the men who are standing about the circle shout and beat their weapons together, a separate detachment of men being located near each group of women for this purpose. During the combined noise of the bull-roarers, the shouting and the beating of the ground, the guardians advance, and, assisted by some of their friends, raise the novices on their shoulders and carry them away, their heads being still covered with the rugs to prevent their seeing anything. The novices are taken as far as the commencement of the *moombeera*, where they are placed lying on the ground with the rugs spread over them. Here they are kept a short time until the women depart from the *būrbūng*, particulars of which will be given presently. This delay also furnishes an opportunity to the men who have been chosen for the *kooringal* to go on to the *kooroorballunga* and paint their bodies jet black with powdered charcoal and grease.

The novices are then raised to their feet and the rugs are adjusted on their heads in such a manner that they can only see the ground in front of them. Their guardians lead them along the pathway and they are shown the marked trees, the drawings on the ground, the fire, the squirrel's nest, etc., and are told to take particular notice of all these things. They are next conducted along the tracks of the emu until they reach the bird lying on the ground, as already described, around which some old men dance and all the people give a shout. After this they proceed to the *eeteemat*, and the novices are placed standing in a row. On being told to raise their eyes, they see two old men sitting on the *warrangooringa* exhibiting different substances out of their mouths, whilst some of the other men are dancing around the heaps of earth. An old man with a *coolamin* of human blood now approaches the novices and rubs some of the blood on their wrists. The guardians again bend down the boys' heads and a start is made for the bush. The *warrangooringa* stumps are then pulled out of the ground and placed upon the fire, some of the men remaining in the vicinity until they are consumed.

---

[1] *Journ. Anthrop. Inst.*, xxv, 308, Pl. xxvi, Fig. 40.

I must now take the reader back to the *bũrbũng* ring. Shortly after the guardians and novices get out of sight, the bushes and other coverings are taken off the women and children by the men who have remained in charge of them. They then gather up their baggage and remove to another locality, perhaps several miles distant, where they erect a new camp, each tribe selecting their quarters on the side of the camping ground nearest their own country. Before starting from the *bũrbũng*, a pole is inserted in the ground in a slanting position, elevated and pointing in the direction of the place where the new camp is to be established. If this locality is some distance off, a long pole is used, making a considerable angle with the horizon, but if the camp is not far away, the pole is shorter and the angle of elevation less. The upper end is decorated by having a bunch of green boughs, grass or feathers attached to it. This indicator is left for the guidance of any natives who may arrive at the main camp after the assemblage has broken up.

As already stated, the novices have started with the men into the bush. They march along with the rugs projecting on each side of the face like a hood—their guardians being with them, and the other men following, making a considerable noise. During the afternoon they arrive at the place where it is intended they shall remain for the night. A semicircular yard is made of bushes or bark, and the novices are placed sitting on leaves spread upon the ground, their backs being toward the men's camp, which may be fifty or sixty yards away. This camp is called *karpan*. Between the men's quarters and the yard in which the novices are kept a space is cleared of all loose rubbish, and one or more fires lit to afford sufficient illumination. After the evening meal has been disposed of, the boys are brought out of their yard and are put sitting down facing the fires, while the Kooringal go through various pantomimic representations and traditional songs. These performances consist for the most part of imitating animals with which the people are familiar, or scenes from their daily life; and, like the ceremonials of other savage races, are largely mixed with obscene gestures. The animals selected include, amongst others, the totems of some of the novices, the headmen and the kooringal.

During the day the men go out hunting, to provide food for all the party, but the novices remain in the camp in charge of a few of their guardians. Several days may be spent in one camp, or perhaps a fresh camping place is reached every night, especially if game is scarce. In the latter case it would be necessary for the novices and guardians to accompany the rest of the men. The novices march along with the rugs on their heads, and when stoppages are made in the bush they are placed sitting on the ground with their hands clutching their genitals. On arriving at the place which has been agreed upon as the camping ground for the night, a yard is made for the boys in the usual manner. During the evenings at these camping places human ordure is occasionally given to the novices in addition to their daily food. If they want anything they are not allowed to ask for it, but must make a sign to the guardian who has charge of them. Some or all of the men who are not attached to the kooringal may go away for a day or two to another camping place some miles distant in quest of food, and contribute a fair share of game to the maintenance of the novices and guardians.

The period spent in the bush with the kooringal is about ten days or a fortnight, being regulated by the weather and other considerations. Different burlesques and songs take place every day, but the general character of the procedure is the same. If the wombat totem is represented, the kooringal crawl under a log as if going into a wombat's hole; if they select the scrub-turkey, all the men scratch the ground with their feet, kicking the rubbish backwards into a large heap resembling the nest of those birds; and so on for any other totems which may be represented.

When the course of instruction in the bush is nearly completed, some strange men, called *irghindaly* or *wyendee*, come from the *ahrowanga*, or women's camp. They belong to a distant part of the tribal territory, and this is their first participation in the ceremony. On approaching the *karpan*, they utter a weird noise, like the howling of the wild dog, and advance in single file, each man holding a leafy bough in front of him, which hides the upper part of his body. The novices are led to believe that a strange mob of blacks are coming to attack the camp. They are then raised to their feet, and placed standing in a row, with their guardians, some of the kooringal, standing on the right and some on the left of the row of boys, having the latter in the middle, holding their hands to their ears. By this time the *irghindaly* have reached the camp, and form into a line parallel with and facing the row of men and novices. They jump and shake their boughs, and then, throwing the latter on the ground, they retire a few yards. The kooringal now step forward and pick up the boughs and strip the leaves off them, shouting *wah! wah!* while doing so. The *irghindaly* then consult with the headmen, and arrange the time for the return of the novices to the *ahrowanga*, after which they go back to the camp from which they have come, and inform the women when the boys may be expected. The mission of the *irghindaly* is analogous to that of the *beegay* of the Kamilaroi, described by me elsewhere, namely, to liberate the novices from the rigorous custody of the kooringal.

That evening at the *karpan*, by the light of the camp fires, some of the usual totemic representations are enacted by the kooringal, after which some of the old men chant *Dharroogan's* song. About sunrise next morning the novices are placed standing in a row beside the camp, with their eyes cast upon the ground. All the men then run about pretending to throw pieces of stick at a squirrel in a tree, and while they are doing so two men step into an open space and swing the *yooloodury*. The blankets are then lifted off the heads of the novices, who are requested to take particular notice of this ceremony. Some armed warriors now rush up to each of the novices in a menacing attitude, and caution them against revealing what they have been taught during their sojourn in the bush. At the conclusion of these proceedings, everything is packed up and a start made toward the women's camp.

After proceeding some miles the party come to a halt at a water-hole or running stream. Here a fire is lit, and they partake of such game as may have been caught during the morning. By and by all the kooringal gather on the bank of the water-hole or creek, and one after another goes into the water, washing off the black coloring matter, after which they come out, and paint their bodies all over with pipe clay. During this time the novices are sitting on the bank of the water-hole—or near the fire if the day is cold—and do not participate in the washing and painting ceremony. This water-hole is one which is always used for the same purpose at every *bŭrbŭng* which takes place in this part of the tribal territory, and is never used for bathing on any other occasion. The journey forward is then resumed, and one of the men goes on ahead to report that the bush contingent will shortly arrive.

I must now give some further particulars of the new camp erected by the women, referred to in an earlier page. The same camp may be occupied all the time the novices are away, or the women may shift to a fresh camping ground every few nights, in conformity with the movements of the kooringal. A patch of ground is cleared near each of these camping places, to which the mothers and sisters of the novices repair every evening for the purpose of singing and dancing during the time the boys are away in the bush with the headmen. As soon as the women are informed of the day which has been fixed for the return of the kooringal, they proceed to this cleared space and erect an avenue of boughs, called the *arrowanga,* in the following manner. In this work they are assisted by the old men who have been with them all the time, and also by the *irghindaly* contingent. A number of small green saplings are cut down with tomahawks, and the stems are inserted in holes made in the ground, all in a line—the bushy tops being sufficiently close together to make a leafy screen, about four feet high. A few feet from this, another line of saplings is set up, parallel with the other. The two rows of boughs are fixed in the ground with a slant toward each other, so that their tops almost meet overhead, forming a kind of arched avenue long enough to hold all the kooringal. A few yards on one side of this avenue, and parallel thereto, the women light about four fires, beyond which they sit down in a row, and commence chanting in monotonous tones.

When all is ready, a signal is given by the men who have charge of the women, and the bush mob approach in single file, all painted white, as already stated. On coming in sight of the *arrowanga,* the novices and their guardians stop behind, and go to another camp a little way off, where they remain for the night. The women are now told to lie down, and are covered with bushes. The kooringal march on and enter the avenue of bushes, one after the other, and sit down with their legs gathered under them in the usual native fashion. During this time a small bull-roarer, called *dhalgüngun,* is sounded out of sight in the rear. A few of the headmen jump round outside the avenue, beating together two boomerangs, and muttering *wooh! wooh!* After going round two or three times, they shout *birr! birr!* and all the women stand up and dance round the men who are hidden in the avenue. After going round a few times, the women commence pulling down the bough screen, upon which all the kooringal rise to their feet, and also commence pulling the bushes out of the ground, breaking them smaller and throwing them on the fires as they jump about. The women also assist in breaking the twigs off the boughs and placing them on the fires. By this time a dense smoke is issuing from the burning bushes, and some of the kooringal stand in the smoke around each fire until they are all sufficiently fumigated. A few of the old headmen stand round directing the proceedings, and the *irghindaly* assist in throwing bushes on the fires when more smoke is required. While the kooringal are standing on the smouldering boughs, the women come up and rub their hands on them, ostensibly to wipe the white paint off them. When the ceremony is over it is getting near sundown, and the kooringal mix with the women and *irghindaly*, and all of them go into the camp adjacent.

During the forenoon of the following day the mothers and sisters of the novices, accompanied by some of the men, again muster at the *arrowanga*, but on this occasion no bough screen is erected, and the women are allowed to see everything which takes place. Some fires are lit and green bushes cut and laid round ready for use. At the camp to which the novices and their guardians went the evening before preparations are also made for the approaching ceremony. The bodies of the boys are smeared over with ashes from the camp fires, and the hair of their heads is singed, to make the women believe that they have been burnt by the evil spirit and have just emerged from the fire. After a mutual interchange of signals that everything is ready at both camps the guardians and novices start forward, marching two and two till they arrive at the *arrowanga*. As they approach the women shout "Heh! heh!" and throw pieces of bark over their heads. The *irghindaly* lay some of the green bushes on the fires and each guardian conducts his novice into the smoke, which curls upward around them both. The mothers of the boys, who have been standing on one side, now advance and rub their open hands over the bodies of their sons, after which they rub their teats on their mouths. The sisters of the novices next step forward and rub their feet on their brothers' ankles. During the whole of this ceremony the novices keep their eyes cast down, and do not look at their mothers or sisters. A signal is now given and they scamper off with their guardians to a camp which has been prepared for them not far away.

At the conclusion of the ceremonies at the *arrowanga* all the tribes shift camp to another place, perhaps a few miles away, and next morning the novices are brought up in close proximity, where they are again smoked, after which they are invited to partake of food spread upon nets by the women. They are then conducted to a camp a little way from the men's quarters, where the old headmen show them quartz crystals and other sacred substances; and also small pieces of wood called *bandhanyay* or *kungara*, on which certain mystic lines are made, said to be the work of Dharroogan. They are forbidden to eat certain kinds of food until released from these restrictions by the old men.

The ceremonies being now at an end, the visiting tribes make preparations for starting on their return journey, and in a few days most of them are on their way homeward, each tribe taking their own novices with them. The latter are kept under the control of their seniors for a considerable time, and must conform to certain rules laid down by the headmen. It is also necessary that they shall attend one or more additional *Būrbūng* gatherings before they can become thoroughly acquainted with the different parts of the ceremonial and be fully qualified to take their place as men of the tribe.

On the Macleay river there is an abbreviated form of inaugural rite, known as the *Murrawin*, and among the tribes occupying the Nymboi and Mitchell rivers there is a short ceremony called the *Walloonggurra*. Both these rites are of a probationary character, leading up to the fuller ceremonial of the *būrbūng*, from which they differ in so many respects that I have thought it necessary to describe them in separate articles.

Before cannibalism ceased to be practiced by the tribes dealt with in this paper it was the custom to kill and eat a man during the *būrbūng* ceremonies. The victim was an initiated man of the tribe, and his flesh and blood were consumed by the men and novices. I am preparing an article dealing fully with this and similar customs, so that further reference is unnecessary at present.

EXPLANATION OF PLATE V.

The *būrbūng* described in the preceding pages completes a series of articles written by me on the different types of initiatory rites of the aboriginal tribes scattered over the whole of New South Wales. I have now prepared a map of the colony, defining the boundaries of the several districts within which each type of ceremony is in force. On this map I have marked the approximate position of these boundaries, and have assigned to each district a distinguishing numeral, from 1 to 9, so that they can be readily identified. It is outside the purpose of this paper to define the areas occupied by the people speaking the different dialects prevalent in each district, but the names of some of the most important of them will be stated in a general way under each number. The reader will be referred to certain articles which I have published describing the initiation ceremonies, and also the totemic divisions of the tribes located inside the boundaries shown upon the map.

No. 1 on the map represents a wide zone of country stretching from near the Murray river almost to the Barwon, occupied chiefly by the Wiradjuri-speaking people. This includes the Wonghibons, a branch of the Wiradjuri, who are spread over the country from Mossgiel to Nyngan.[1] On the Lower Murrumbidgee and extending up the Murray from about Euston are several small tribes speaking the following dialects: The Eetha-eetha, Watthi-watthi, Kianigani, Yuppila, Yota Yota, Boorabirraba and some others on the upper Murray whose initiation ceremonies are the same as the Wiradjuri. For my descriptions of the *bŭrbŭng* of these people the reader is invited to peruse the following publications: *Journ. Anthrop. Inst. London*, Vol. xxv, pp. 295–318; *Ibid.*, Vol. xxvi, pp. 272–275. *Proc. Roy. Geog. Soc. Aust.* (Q.), Vol. xi, pp. 167–169, and *Journ, Roy. Soc. N. S. Wales*, Vol. xxxi, pp. 111–153. I have also dealt with their totemic division in the last-named work, pp. 171–176.

No. 2 includes the country of the Kamilaroi, Yookumble, Wallaroi, Pickumble, Yuollary, Wailwan, Moorawarree and a few others. The Bora ceremony of these tribes is described by me in the following works: *Journ. Anthrop. Inst. London*, Vol. xxiv, pp. 411–427; *Ibid.*, Vol. xxv, pp. 318–339; *Journ. Roy. Soc. N. S. Wales*, Vol. xxviii, pp. 98–129; *Ibid.*, Vol. xxx, pp. 211–213; *Proc. Roy. Soc. Victoria*, Vol. ix, N. S., pp. 137–173. I have described their totemic divisions in *Journ. Roy. Soc. N. S. Wales*, Vol. xxxi, pp. 156–168.

No. 3. In this tract of country the Bunan ceremony is in force. Some of the dialects are the Thurrawall, Wodi Wodi, Jeringin, Ngarroogoo, Beddiwell, Mudthang, Dhooroomba, Gundungurra and Wonnawal. I have given a comprehensive account of this ceremony, with a plate illustrating the Bunan ground and the different objects connected with it in the *American Anthropologist*, Washington, Vol. ix, pp. 327–344.

---

[1] Mr. A. L. P. Cameron kindly furnished me with the location of the Wong hibon, Eethee Eethee and Watthi Watthi tribes.

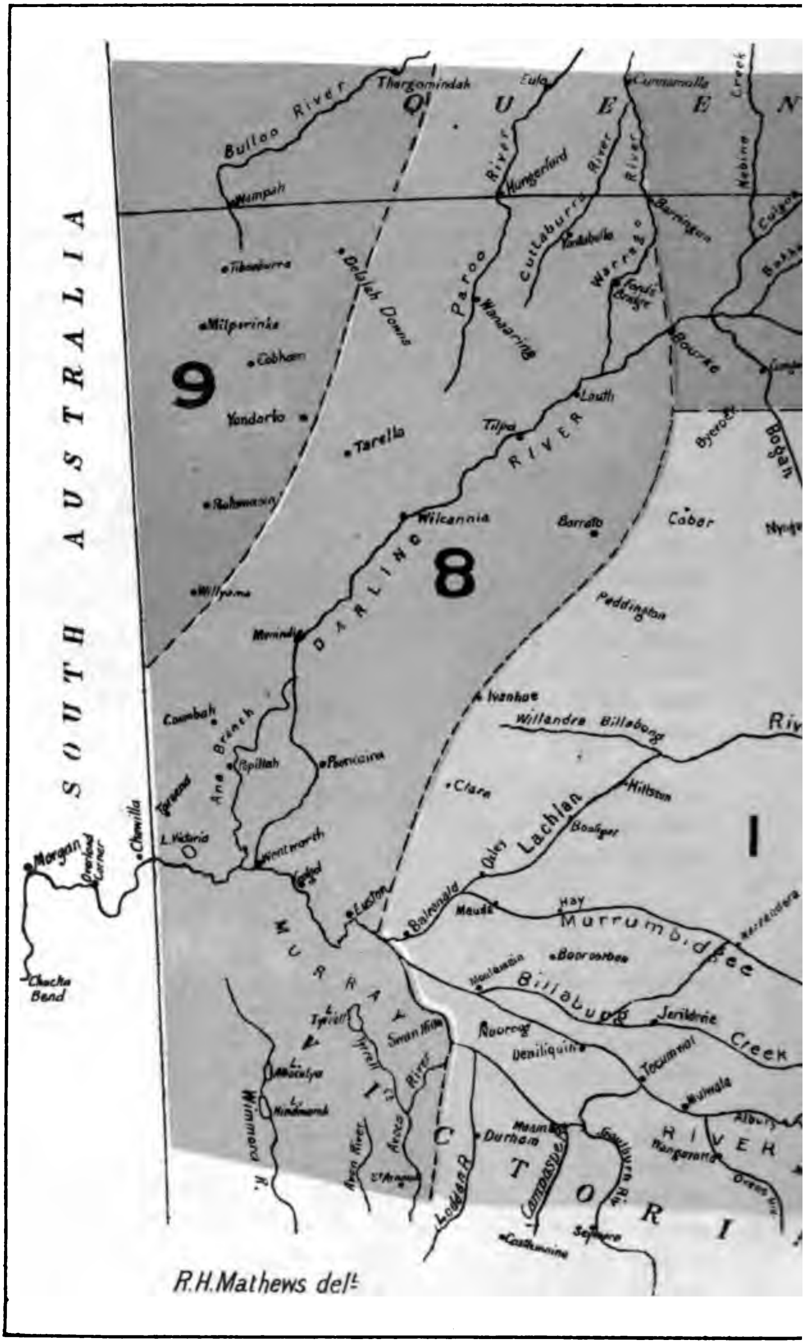
No. 4 represents the country occupied by the tribes speaking the Darkinung, Wannerawa, Warrimee, Wannungine, Dharrook and some other dialects. Their country commences at the Hunter river and extends southerly till it meets and merges into that of the people of No. 3. Their ceremony of initiation is known as the Narramang, which is described in a paper published in *Proc. Roy. Soc. Victoria*, Vol. x, N. S., pp. 1–12. Their totemic system is dealt with in *Journ. Roy. Soc. N. S. Wales*, Vol. xxxi, pp. 170–171.

No. 5. Within this area, which extends from the Hunter river almost to the Macleay, the initiation ceremonies are of the Keeparra type described by me in *Journ. Anthrop. Inst. London*, Vol. xxvi, pp. 320–340. This tract of country is inhabited by the remnants of the tribes speaking different dialects, some of the most important of which are the following: Wattung, Gooreenggai, Minyowa, Molo, Kutthack, Bahree, Karrapath, Birrapee, etc. North of the Hunter river and extending along the sea coast to about Cape Hawk there is an elementary ceremony called Dhalgai, which I have included in the article last quoted.

No. 6 represents the hunting grounds of the tribes whose initiation ceremonies are dealt with in the preceding pages. Their sectional divisions are the same as the tribes in No. 5, and are described in *Jour. Roy. Soc. N. S. Wales*, Vol. xxxi, pp. 168–170.

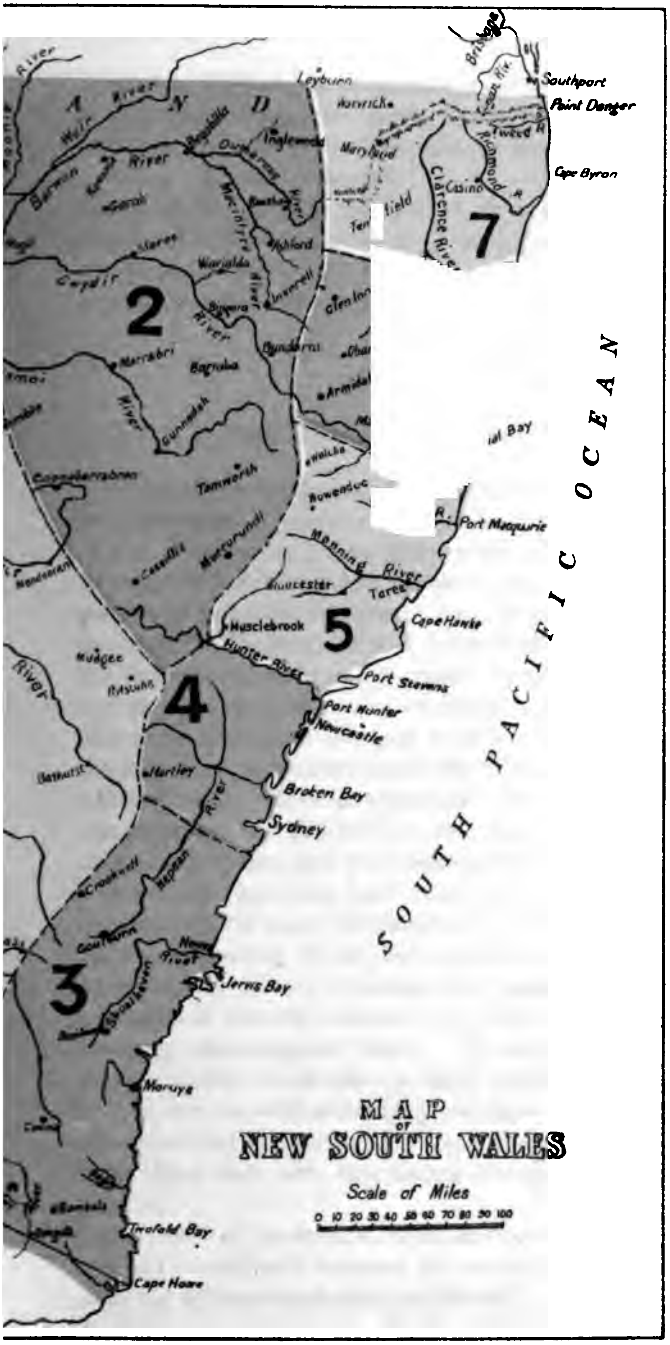
No. 7 comprises the country of the Bunjellung, Gidjoobal, Kahwul, Nowgyjul, Watchee, Yackarabul, Ngandowul and some other small tribes, whose initiation ceremonies are of the Wandarral type, described by me in *Proc. Roy. Soc. Victoria*, Vol. x, N. S., pp. 29–42. Districts Nos. 2, 7, 8 and 9 cross the boundary of Queensland, and Nos. 1 and 8 extend some distance into the Victorian frontier.

No. 8. On the west of Nos. 1 and 2 are the Barkunji, Bungyarlee, Bahroongee, Wombungee, Noolulgo and some other tribes, occupying the country on both sides of the Darling river, as well as on the Lower Paroo and Warrego. South of the Murray river are several small tribes, among which may be mentioned the Wamba Wamba, Waiky Waiky, Latjoo Latjoo, Mutti Mutti, etc. I have



R.H.Mathews delt

VOL. XXXVII, No. 157, PLATE V.



referred to the totemic divisions of the Barkunji and kindred tribes in *Proc. Roy. Geog. Soc. Aust.*, Queensland, Vol. x, p. 32. Their initiation ceremonies are described by me elsewhere.

No. 9. In this triangular portion of New South Wales we encounter the advance guard of those tribes who practice circumcision and subincision, extending thence northerly into Queensland and westerly into South Australia. The customs of these people will be dealt with by me in another article.

APPENDIX.

THE NGUTTAN INITIATION CEREMONY.

In this article it is intended to give a short account of the *Nguttan*, an abbreviated ceremony of initiation practiced by the native tribes of the Williams and Gloucester rivers and surrounding country. Although it is not necessary to muster the whole community for the purpose of installing the youths into the privileges of tribesmen by means of the *Nguttan*, yet it is always thought safest to consult with the headmen of some of the nearest neighboring tribes, who may also have one or more youths old enough to pass through the ordeal. The preliminaries are arranged by means of messengers, and when the appointed time comes round the tribes proceed to the appointed meeting place. Here the combined concourse indulge in corroborîes and songs at night by the camp fires. The men of each tribe dance in their turn and their women beat time for them.

When the festivities have lasted for a few days the headmen decide upon the time for taking away the novices. Early on the appointed morning all the men assemble under pretense of going on a hunting expedition, or perhaps they represent that they are making an incursion into the country of a hostile tribe for the purpose of avenging some supposed injury. The novices are mustered out of their mothers' camps and are taken charge of by the men. The women are not told anything about these proceedings, but all the elder ones and those who have been present at similar gatherings before form their own conclusions in regard to the purpose of the meeting.

A number of the men, with the novices amongst them, start first, and are immediately followed by the rest of the men, singing and shouting as they march along in the rear. The novices are told that these incantations are for the purpose of making a plentiful supply of game, or to cause them to be victorious over their enemies. The men are painted in the manner customary on these expeditions. After traveling perhaps several miles they come to a water-hole or running stream, where a halt is made. The novices are now taken charge of by the men who have been appointed for this duty. Each of these men is the brother-in-law—actually or collaterally—of the graduate who has been placed under his care.

The novices are stripped naked, and after being painted are placed sitting cross-legged on the ground, with both hands grasping their genitalia and their heads bowed toward their breasts. Their guardians and some of their relatives remain with them, but all the other men go away, taking their departure quietly and a few at a time so that the boys may not know that they are gone. These men go away to a suitable camping ground, perhaps a mile or two distant, which has previously been agreed upon, and there they erect a camp of bark or bushes and spread leaves on the ground for the novices to lie upon. They then go into the bush hunting to provide food for themselves and the rest of the party. Late in the afternoon the guardians and other men who remained with the novices bring the latter to this new camp—each boy with his eyes cast down and being forbidden to look at anything around him—and place them lying down upon the leaves with rugs thrown over them. Fires are lit near where they are lying,[1] and they are subjected to considerable heat, which causes them to perspire very freely, but they are not permitted to move and must keep silent.

During the evening, perhaps an hour after sundown, by the light of the camp-fires, some of the usual totemic dances, described by me in previous communications, and other instructive performances, are gone through by the men, and the novices are allowed to sit up and look at them. Some of the men exhibit their genitals to the boys and invite them to pay especial attention to a number of other obscene gestures. After this human excrement is thrown to the novices, which they are required to eat, and also to drink urine out of a native vessel. At the conclusion of these proceedings all hands lie down for the night.

Early next morning about half the men start away without the knowledge of the boys and go into the bush in quest of food.

---

[1] Compare with the fire ordeal described by me in "The Bunan Ceremony of N. S. Wales," in the *American Anthropologist* (1896), Vol. ix, pp. 335, 336.

About midday they return, and on coming within hearing of the camp they commence making a weird noise, like the howling of the native dog, and advance in single file, each man carrying a leafy bough which hides his face and chest. When these men, who are called *ghirrang*, reach the camp where the novices are they spread out in a line and spring up into the air, waving their arms and uttering grunt-like exclamations. The novices are led to believe that the ghirrang belong to a hostile tribe and will perhaps attack them and their guardians.

The ghirrang and other men then produce several small sheets of bark stripped from trees, on which some *dharroong* devices have been carved, similar to the marks on the trees standing around a Keeparra ground.[1] These pieces of bark are placed at intervals of a few yards along the cleared space which was used for dancing and performing upon the previous night. The novices are now brought out in front of these pieces of bark and are invited to take particular notice of them. They are at first shown the dharroong on one sheet of bark, and are then taken to each of the others in succession, but are not allowed to speak a word.

When this part of the ceremony has been disposed of, the men form into two divisions—one mob standing on one side of the cleared space and another mob on the other side—the graduates being placed in a row facing them. The humming sound of the bull-roarer, *mudthinga*, is now heard a little way in the rear, and almost immediately two men step out into the opening, each man swinging one of these instruments at the end of a string. The usual obligations of secrecy are then imposed upon the neophytes, after which the sacred *mudthinga* is rubbed upon their penises, chests, arms and other parts of their bodies. While doing this the string of the bull-roarer is placed round each lad's neck in rotation.

The guardians, novices, and all the rest of the men now start away from that place, and proceed toward the women's camp—which, it should be mentioned, was removed to another locality the same day the men and boys went away. A man is sent ahead to announce that the contingent from the bush will return presently, and upon receipt of this message the women muster on a level, open parcel of land contiguous to their camp. Here the mothers of the neophytes spread nets upon the ground, on which they lay food for the use of their sons. The sisters of the novices and the other women also assemble near this spot, which is called *ngurra nyalla.*

---

[1] See my "Keeparra Ceremony of Initiation," *Journ. Anthrop. Inst.*, Vol. xxvi, pp. 320–338, Pl. xxxii, Figs. 6 to 13.

When these preliminaries have been arranged, the men and boys come marching on, painted and dressed in their full regalia as men of the tribe, and as they approach the women throw sticks over their heads. The novices step forward to the nets, and eat the food which their mothers have provided for them. After this the women return to their own camp, but the graduates are taken by their guardians to a place near the single men's quarters. During that evening some of the old headmen show the novices the sacred white stones, which are so much valued by all native tribes.

These white stones, which in this district are called *buggan,* are said to be found in the scrubby mountains beyond Bandon Grove, near the head of the Williams river, and are supposed to be the excrement of *Gœñ Mudyer Dhingga* (Gœñ of the Hairy Hands), a malevolent being who has his abode in these mountain fastnesses. A number of clever old men—the so-called wizards of their tribes—used to make periodical expeditions into these regions for the purpose of obtaining supplies of the *buggan.* On these occasions it was not considered safe for a man to travel alone, but it was necessary that several should go in company. At their camps at night they were required to sing songs similar to those which form part of the *keeparra* ceremonial, and the camp-fires had to be maintained by burning certain kinds of wood to be found in that district. During the night, while the old men were asleep, Gœñ was supposed to appear, accompanied by some of his coadjutors, and put white stones into their *dilly* bags.

If any of the old men of the company had been remiss in their observance of any of the tribal customs, they would keep awake, holding a burning brand in their hand, in order to protect themselves against Gœñ's evil designs. The only way in which such men could secure the sacred *buggan* was to search for them along the sides of hills or watercourses, where they had been deposited by Gœñ.

Every youth who graduates through the Nguttan is required to attend the next keeparra ceremony which takes place among his own people—or the *bŭrbŭng* of those tribes who adjoin them on the northwest—in order that he may receive further instruction in the sacred initiatory rites of the community.

Short or probationary forms of inauguration ceremonies are found in several districts, and a knowledge of them is highly valuable, as exhibiting the various stages through which a youth must pass before he is qualified to take his place as a full man of his tribe. In a different portion of the same tract of country, there is another elementary ceremony known as the *Dhalgai*, described by me elsewhere.[1] Both the *Nguttan* and the *Dhalgai* are practiced in parts of the geographical area represented as No. 5 on the map of New South Wales hereto appended (Plate V).

PRELIMINARY NOTE ON THE SELENODONT ARTIODACTYLS OF THE UINTA FORMATION.

BY W. B. SCOTT.

(Read March 18, 1898.)

In 1895, Mr. J. B. Hatcher collected for the Princeton Museum some unusually well-preserved specimens of Selenodont Artiodactyls in the Uinta beds of northern Utah. In preparing a monograph upon these forms I have found certain new and undescribed genera which have proved to be of remarkable phylogenetic interest, and the much more complete material now available of genera previously named gives us most welcome information. As the detailed account of these fossils cannot appear for many months, it is desirable to publish a brief notice of the new forms and of the principal conclusions to which the study of the Uinta Selenodonts has led. One of the most marked changes between the mammalian life of the Bridger and that of the Uinta is in the great increase of the Artiodactyls in general and of the Selenodonts in particular. In the Bridger beds only two genera at most of the latter group have been described, and remains of even these are very rare; in the Uinta, on the other hand, Artiodactyls are the most abundant fossils and not less than eight genera of Selenodonts may be determined, while others are indicated by specimens not sufficiently well preserved for description.

The most interesting and striking result to which the study of the

---

[1] "The Dhalgai Ceremony," *Journ. Anthrop. Inst.*, Vol. xxvi, pp. 338–340.

Uinta Selenodonts has led is the very unexpected conclusion that, *with the possible exception of the Oreodonts and Agriochœrids, all of the strictly indigenous North American Selenodonts are derivatives of the Tylopodan stem.* The true Ruminants (Pecora) are an Old World type and did not reach this continent till late Miocene times, but the Tylopoda underwent an expansion and differentiation in America comparable to that of the Pecora in Europe, of which they took the place here. This conclusion was long ago suggested, with wonderful insight, by Rütimeyer, but as he did not discuss the question and brought forward no evidence in support of his views, the suggestion never attracted the attention which it so well deserved. The White River forms, *Leptomeryx*, *Hypertragulus*, *Hypisodus* and *Protoceras*, have long baffled the investigator who attempted to determine their true systematic position, but it has now become exceedingly probable that they are all variants of the Tylopodan type, the main line of which is represented in White River times by the genus *Poebrotherium*, whose position has long been recognized as ancestral to the modern camels and llamas. It should be added, however, that this somewhat surprising result has been much strengthened and confirmed by far more complete material of *Leptomeryx* and *Hypertragulus* than had previously been known. This new material, which was gathered at various times by Messrs. Hatcher and Gidley, makes the Tylopodan affinities of these White River genera much more conspicuous than any one had imagined. In the extended paper which is now in course of preparation these newly obtained specimens will be described and figured in comparison with their forerunners of the Uinta.

PARAMERYX Marsh.

Amer. Jour. Sci., third series, Vol. xiv, p. 364 (*nomen nudum*).
Ibid., Vol. xlviii, p. 269.

In this genus the dentition is complete, I. $\frac{3}{3}$, C. $\frac{1}{1}$, P. $\frac{4}{4}$, M. $\frac{3}{3}$ and there are no diastemata. The incisors and canines are small, the premolars simple and trenchant and the molars very brachyodont and composed of four crescents. The skull is exceedingly like that of *Poebrotherium*, but has a shorter muzzle, a less capacious cranium, a more widely open orbit and a very much smaller tympanic bulla, which is not filled with cancellous tissue. The ulna and radius are separate, at least in young individuals; the manus consists of four functional digits, though the lateral metacarpals are already very much more slender than the median pair. The fibula is complete and not coössified with the tibia at any point, but its shaft is so reduced as to be a mere thread of bone. The pes contains two functional metatarsals, iii and iv, while Nos. ii and v are long, filiform and splint-like rudiments to which, apparently, no phalanges are attached, but this is still doubtful. The phalanges of the functional digits resemble those of *Poebrotherium*, and the unguals have the same long, pointed and slender, antelope-like shape.

There can be very little doubt that *Parameryx* is the direct and immediate ancestor of the White River *Poebrotherium*, which it so much resembles, and thus it holds an important place in the main line of Tylopodan descent.

LEPTOTRAGULUS Scott and Osborn.

PROC. AMER. PHIL. SOC., 1887, p. 258.

In a former account of this genus,[1] the type of which is a fragment of the mandible containing p $_{\overline{3}}$, $_{\overline{4}}$ and m $_{\overline{1}}$, I made the mistake of referring to it certain limb and foot bones which, it is now apparent, belong to the very distinct genus *Parameryx*, from which *Leptotragulus* differs in the form of the premolars and in the presence of diastemata. At present I am not able to refer to the latter genus any of the newly acquired material, and hence can add nothing to my original account[2] of it. It differs but comparatively little, however, from the following genus, the structure of which may be very fully described.

MERYCODESMUS, gen. nov.

Dentition unreduced; I. $\frac{3}{3}$, C. $\frac{1}{1}$, P. $\frac{4}{4}$, M. $\frac{3}{3}$; upper incisors conical, pointed and slightly recurved; upper canine large, compressed and thick; lower canine incisiform; p $^{\underline{1}}$ near canine, with diastema behind it; p $^{\underline{3}}$ with deuterocone; p $_{\overline{1}}$ caniniform and opposing upper canine; p $_{\overline{4}}$ with large deuteroconid. Molars composed of four crescentic lobes, m $_{\overline{3}}$ with fifth lobe. Forehead elongate and lozenge-shaped, sagittal crest short, as in *Parameryx;* mandible with very extended angle. Manus and pes having four functional digits; lateral metapodials less reduced than in *Paramery x*.

---

[1] TRANS. AMER. PHIL. SOC., Vol. XVI, p. 479.

[2] PROC. AMER. PHIL. SOC., 1887, p. 258.

Merycodesmus gracilis, sp. nov.

Size small; orbit small and bounded behind by very long decurved postorbital process of frontal; cranium relatively broad and capacious; mandible very slender.

Measurements.

Upper dentition, length I 1 to M 3	0.071
" premolar-molar series, length	.054
" molar series, length	.022
" canine, ant.-post, diameter	.006
" canine, transverse diameter	.003
" M 1, length	.006
" M 1, width	.0085
" M 2, length	.008
" M 2, width	.010
" M 3, length	.009
" M 3, width	.011
Lower dentition, length I 1 to M 3	.072
" premolar-molar series, length	.058
" premolar series, length	.032
" molar series, length	.026
" P 1, length	.0045
" P 2, length	.0055
" P 3, length	.007
" P 4, length	.0065
" M 1, length	.0065
" M 2, length	.0075
" M 3, length	.011

(N. B.—The apparently great length of the premolar series is due to the diastema behind p1)

The dentition of *Merycodesmus* is quite similar to that of *Paramery x*, but differs in certain very significant ways. Thus, the lower incisors have more chisel-shaped crowns, and the lower canine has become one of them in form and function; the upper canine is much larger and the first lower premolar has taken on the form and function of the canine. In each jaw a long diastema separates p 1 from p 2. The other premolars and the molars are much alike in the two genera save that the latter are relatively broader in *Merycodesmus*. This genus differ from *Leptotragulus* in the greater complexity of the inferior premolars, and especially in the large development of the deuteroconid on p $_{4}$. From *Oromeryx* it may be distinguished by the diastemata and by the more symmetrically quadrate shape of the upper molars.

The skull bears a close resemblance to that of *Parameryx*, but has a somewhat more elongate muzzle and longer postorbital processes of the frontals; the forehead has the same elongate lozenge-like shape, the temporal ridges converging gradually behind into the short sagittal crest; the mandible has an elongate, slender horizontal ramus, which is somewhat stouter than that of *Parameryx;* whether the very broad ascending ramus possessed a similar hook-like angle to that of the latter genus cannot at present be precisely determined; the coronoid process is even more recurved and pointed. The posterior nares are far back, their front border being opposite m ^{3}, and a deep palatal notch intervenes between the hinder half of m ^{3} and the external wall of the narial canal.

The axis has a conical odontoid process.

The fore foot has four digits, of which the lateral metacarpals are reduced and slender, though distinctly less so than in *Parameryx*. The tarsus is lower than in the latter genus, and the lateral metatarsals are functional, not mere filiform splints. The phalanges are essentially alike in the two genera.

The entire structure of *Merycodesmus* strongly suggests that it was the forerunner of the White River genus, *Leptomeryx*, and, through a somewhat different line, of *Protoceras* also. In *Leptomeryx* the upper canines have been lost, the lower canine resembles an incisor, but p $_{1}$ is just like a minute canine and one can hardly escape the inference that it formerly functioned as a canine and has dwindled because of the loss of the upper canine, which it opposed. *Protoceras* still retains, in the male sex, the large upper canine, which is opposed by p. $_{1}$ and thus abraded upon the posterior surface, but in the females the upper canine is vestigial.

CAMELOMERYX, gen. nov.

I.^{2}, C.^{1}, P.^{4}, M.^{3}. Upper incisors small, canines stout, but short; a long diastema between p ^{1} and p ^{2}. Premolars and molars closely resembling those of the preceding genus, but molars with larger external buttresses. Forehead broad and short, sagittal crest long; temporal ridges confined to frontals. Posterior nares farther back than in *Merycodesmus* and palatal notches absent.

In this genus the superior dentition is, except in the character of the incisors, very similar to that of *Merycodesmus*, but the shape of the forehead, the cranium and the hinder part of the palate are very different. In the absence of the lower jaw, it is not practicable to determine finally whether this form is congeneric with *Leptotragulus*, but the character of the upper premolars leads me to believe that it will prove to be quite distinct.

Camelomeryx longiceps, sp. nov.

Size, small; cranium long and slender; orbits small and widely open behind; postorbital processes of frontals extended transversely, but little decurved.

Measurements.

Upper	dentition, length I 1 to M 3	0.062
“	canine, ant.-post. diameter	.005
“	canine, transverse diameter	.003
“	premolar-molar series, length	.051
“	premolar series, length	.029
“	molar series, length	.021
“	M 1, length	.0055
“	M 1, width	.0075
“	M 2, length	.007
“	M 2, width	.010
“	M 3, length	.0085
“	M 3, width	.0115

That *Camelomeryx* and *Merycodesmus* are nearly allied genera will be at once apparent from the foregoing description. Whether the former is the ancestor of some White River genus, such as *Hypertragulus*, or whether it is a mere variant of *Merycodesmus* and without permanent phylogenetic significance, must await the decision of more complete material.

OROMERYX Marsh.

Oromeryx Marsh, *Amer. Journ. Sci.*, third series, Vol. xiv, p. 364 (*nomen nudum*).

Oromeryx Marsh, *Amer. Journ. Sci.*, third series, Vol. xlviii, p. 269.

No representative of this genus has yet been detected in the Princeton collection; it may be distinguished from the preceding genera by two principal characters. According to Marsh, "there is no diastema in the dentition," and in the second place, his figure shows that the upper molars, especially m $^{\underline{3}}$, have a subovate crown, due to the much greater transverse breadth in the anterior than in the posterior half.

PROTOREODON Scott and Osborn.

Agriochœrus Marsh (non Leidy), *Amer. Journ. Sci.*, third series, Vol. ix, p. 250.

Eomeryx Marsh, *ibid.*, Vol. xiv, p. 364 (*nomen nudum*).

Protoreodon Scott and Osborn, PROC. AMER. PHIL. SOC., 1887, p. 257.

Eomeryx Marsh, *Amer. Journ. Sci.*, third series, Vol. xlviii, p. 266.

The collection contains a large number of specimens appertaining to this genus, and adds very materially to our knowledge of it, but as the newly acquired individuals only confirm the conclusion previously reached, that this genus is ancestral to the *Oreodontidæ* of the Oligocene and Miocene, description of the new material will be reserved for the extended paper.

AGRIOTHERIUM gen. nov.

Premaxillaries reduced and upper incisors small; upper canine large, recurved and trihedral; premolars simple and thick transversely; p $_{\overline{1}}$ caniniform; p $^{\underline{3}}$ implanted by three fangs, but has no deuterocone; deuterocone of p $^{\underline{4}}$ conical, not crescentic; molars like those of *Protoreodon*, but with outer crescents of superior molars more concave, and more prominent median buttress, into which median valley extends. Cranium relatively longer and face shorter than in *Protoreodon* and postorbital processes of frontals shorter.

This genus is evidently very close to *Protoreodon*, but may be distinguished from it by the reduced premaxillaries, the smaller incisors, the simpler premolars and the more concave outer lobes of the upper molars, as well as by the longer cranium, shorter face, and less prominent postorbital processes.

Agriotherium paradoxicum, sp. nov.

Skull about equal to that of *Oreodon gracilis* in length, but much more depressed; mandible stout and chin steeply inclined.

Measurements.

Skull, length on basal line	0.131
" width across zygomata	.077
Length occ. crest to ant. border of orbit	.085
" ant. border orbit to prmx	.051
Mandible, height of condyle	.048
" depth at m.$_{2}$	.025
Upper premolar-molar series, length	.0525
" premolar series, length	.029
" molar series, length	.024
" canine, ant.-post. diameter	.006
" canine, transverse diameter	.006
" P 1, length	.0075
" P 2, length	.0065
" P 3, length	.007
" P 3, width	.006
" P 4, length	.006
" P 4, width	.0085
" M 1, length	.075
" M 1, width	.009
" M 2, length	.008
" M 2, width	.011
" M 3, length	.009
" M 3, width	.012
Lower P 3, length	.007
" P 3, width	.003
" P 4, length	.0075
" P 4, width	.004
" molar series, length	.027
" M 1, length	.007
" M 1, width	.0055
" M 2, length	.008
" M 2, width	.006
" M 3, length	.012
" M 3, width	.007

The differences between *Protoreodon* and *Agriotherium* are such as strongly to suggest the inference that, while the former is the ancestor of the Oreodonts, the latter stands in a similar relation to the Agriochœrids. This determination can, at present, be only provisional, until more is learned concerning the foot-structure of the present genus. At all events, if *Agriotherium* be not the desired ancestral form, we may feel confident that that form, when found, will prove to be of a very similar character.

HYOMERYX Marsh.

Amer. Journ. Sci., third series, Vol. xlviii, p. 268.

This genus, which is described as having no upper incisors, I have not seen. It differs from the two preceding genera not only in the loss of the upper incisors, but also in the form of the upper molars, which have far less concave external crescents, and less prominent outer buttresses.

The study of the Uinta Selenodonts lends much strength to the opinion expressed by various writers, that the Oreodonts are related to the Tylopoda. It now appears likely that this family leads back either to *Homacodon* of the Bridger, or to some nearly allied form of the same family. If this be true, we shall then have the more extended generalization, that all of the indigenous North American Selenodonts belonged to the Tylopoda and that this suborder has had a much more extended and varied development than we have hitherto supposed. While this conclusion is already extremely probable for the other families, we have yet to find the direct forerunners of *Protoreodon* and *Agriotherium* before it can be established for the Oreodonts and Agriochœrids.

Stated Meeting, April 1, 1898.

Mr. FREDERICK PRIME in the Chair.

Present, 12 members.

Correspondence was submitted and donations reported.

Dr. Morris, on behalf of the Curators, exhibited a *facsimile* of the Declaration of Independence in the handwriting of Thomas Jefferson, which, with some accompanying memoranda also in their possession, they have had framed for better preservation.

It is evidently the same as that contained in Vol. iv of Randolph's ***Memoirs of Jefferson***, and likewise from the same plates as (previous to their completion) the proof copy in a black frame now in the Library, and identified as such by Mr. Corbin, of the American Bank Note Company, by marks of the unfinished condition of one of the plates, absence of notes "Dr. Franklin's handwriting" and "Mr. Adams' handwriting" from margin, as well as by the texture of the paper.

This *fac-simile* now framed for preservation has at commencement the marks in ink "Draft 'A'"; the handwriting of which is pronounced by Mr. F. J. Dreer to be that of John Vaughan, an interesting letter from whom, as to the Jefferson-Lee MS. is in Mr. Dreer's collection at the Historical Society's hall, also an alleged *fac-simile* of the originally signed document on quarto paper, otherwise closely resembling this Draft A, but lithograph, said to be copied from MS. in Department of State at Washington; none such is known there. This framed *fac-simile* has also the following in leadpencil, "these leadpencil marginal entries make Draft B—this Draft B is copy sent to Lee by Jefferson."

Mr. Dreer also identifies the marginal notes as to handwritings of Dr. Franklin and Mr. Adams, as the *fac-simile* of Jefferson's handwriting, so that the latter must have annotated the copy used in preparing Jefferson's ***Memoirs*** by Randolph.

He also finds in his diary of May 13, 1889, as follows:

"Met Major Frank Etting, Fred. D. Stone, Simon Gratz and Mr. Philip S. P. Connor, at the Philosophical Society rooms to compare and determine who wrote the interlined and marginal notes on the proof copy of the Declaration of Independence." This explains the attached note of F. M. E. of the same date.

A copy is also given of letters of Jefferson and R. H. Lee, the latter dated from Chantilly, his residence in Virginia, as to the Jefferson-Lee document.

DR. HAYS asked if this is the *fac-simile* copy which Dr. Morris took out of the Librarian's desk last autumn under the impression that it was an unknown, original, Jefferson autograph draught of the Declaration of Independence.

DR. MORRIS replied that it was the same copy.

DR. HAYS stated that this *fac-simile* is catalogued on page 573 of the printed catalogue of the Society's library, and had the library officials had any intimation of Dr. Morris' intention to take it he would have been informed that it was only a *fac-simile* of the well-known rough draught, which has been reproduced in almost every edition of Jefferson's works. It has all the appearances of having been torn out of a copy of Randolph's edition and possesses no special value.

MR. EDMUNDS asked where the original of this *fac-simile* is.

DR. MORRIS replied that it is in the possession of the University of Virginia.

DR. HAYS expressed surprise at this statement, as he was not aware that the University of Virginia had ever possessed it. The United States claimed to have acquired it fifty years ago, with the other Jefferson papers from the Jefferson heirs, who, by the terms of their sale to the United States, agreed to convey "all the papers and manuscripts" of Thomas Jefferson in their possession. In the Department of State at Washington there is framed under glass and kept in a fireproof safe a manuscript which is said to be this original.[1]

Mr. James Douglas presented an obituary notice of Dr. Thomas Sterry Hunt.

The following communications were presented:

By Prof. Edward H. Williams, Jr., "Notes on Kansan Drift in Pennsylvania."

By Mr. John Van Denburgh, "Herpetological Notes."

By Dr. I. Minis Hays, "A Note on the History of the

---

[1] Dr. Hays has since verified the statement that this original is in the Department of State at Washington.

Jefferson Manuscript Draught of the Declaration of Independence in the Library of the Society."

By Mr. S. F. Peckham, "The Genesis of Bitumens, as Related to Chemical Geology."

Pending nominations Nos. 1432 and 1451 to 1457 and new nominations Nos. 1458 to 1464 were read.

The Society was adjourned by the presiding member.

NOTES ON KANSAN DRIFT IN PENNSYLVANIA.

BY PROF. EDWARD H. WILLIAMS, JR.

(Read April 1, 1898.)

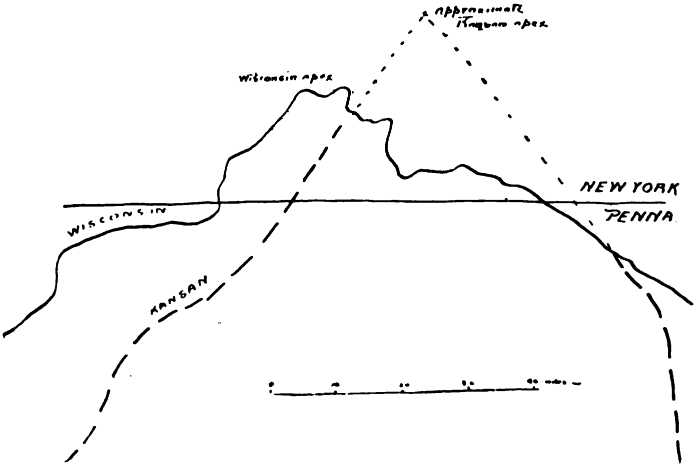
The writer uses the terms Kansan and Wisconsin to represent respectively the furthest ice advance and the first great moraine of recession which was delimited by Lewis and Wright, without accepting the differences in age claimed by some authorities. His work since 1893 has been a study and mapping of the Kansan deposits in this State, and papers have been published from time to time, copies of which have been deposited in the library of this Society.

At the Buffalo meeting of the American Association for the Advancement of Science, in 1896, the writer presented a few notes on the work of the preceding months and claimed that the ice which covered the northern part of this State originated at two centres, an eastern and a western, as the lithological burden on either side of the apexes of both Kansan and Wisconsin deposits differed widely in character, kinds and amount of crystalline and clastic material. This claim was further substantiated by the fact, shown in the sketch accompanying this paper, that the apex of the earlier line of drift had been overridden by the latter, while, had the latter been a moraine of recession only, there should have been a continuous Kansan border.

To these claims the writer now wishes to add two more. First, that the powers of the two bodies of ice on either side of the apex were unequal, as the eastern Kansan border will average thirty miles in width, while the western averages but six. This is in accordance with the deductions of the late Prof. James D. Dana, in the last paper he wrote on glaciation, in attempting to account for the wide difference between the eastern and western deposits. It is well known that Mr. Upham began his work in the east and held to the theory of a single glacial epoch. After work in the west he accepted that of two or more periods. On his return to the east he returned to his first opinion. This is an epitome of the wide difference in appearance between the few strong moraines of the east and the multiplicity of the deposits of the west, and Prof. Dana theorized that such difference must have been caused by the abundant precipitation of the east and the scanty precipitation of the west, so that the deficit of dry seasons would bear a smaller proportion to the total precipitation in the east than in the west, and the strength and persistence of the ice at certain latitudes in the east would be balanced by the many fluctuations of the west. The strength thus predicted for the eastern glacier is shown by the wider margin found and by the variation in the position of the apex. While the western Kansan ice retreated to the position taken by the Wisconsin margin, the relaxation of the pressure was accompanied by an advance of the eastern ice across the region of the apex.

The second claim for a double origin substantiates the theory, as there was found in the summer of 1897, at East Warren, Pa., forty feet below the original surface and 100 feet above the water of the Allegheny river, a rolled piece of native copper as long and thick as the finger, in a lenticule of dense till which resisted the pick. The matrix of clay had preserved the copper from oxidation to such an extent that its surface was still smooth, and with it were found fresh rolled and glaciated crystalline pebbles and local angular clastics. This lenticule was about 120 feet above the rock surface, as shown by a neighboring well section, and the original thickness of glacial deposit was thus 160 feet. This find shows that the western ice traversed the region of the great lakes in a southeastern direction and proves that we had a meeting of two ice sheets near Salamanca, N. Y. The variations in strength and the varying number of moraines of the eastern and western glaciers are thus satisfactorily settled in a simple manner. It remains to say that the writer was unaware at the time he first made the claim for two origins that Prof. Wright had surmised the same (*Ice Age*, p. 443) from the symmetry of the moraine delimited by Mr. Lewis and himself with respect to origins near Lake Superior and Labrador. It was a surmise only, as he states that these need not have been origins, and the ice may have traversed them from some more northern point. The first distinct proof of such difference of origin rests with the writer.

This glacial deposit of East Warren disposes, also, of another question which has been much debated, whether there was more than one ice age.



The writer has already disposed of the question for eastern Pennsylvania, by showing that the Lehigh and its tributaries acquired their present level in pre-Kansan times. The lenticule at East Warren was about 100 feet above the present Allegheny; but the rock floor, as shown by a well section near, was 120 feet below the lenticule, or twenty feet below the present Allegheny. Other well sections show that this floor is dipping steeply and toward the west, so that it reaches greater depths below the present river level. This lenticule was forty feet below the old surface at this point; but this surface rose on going west, so that in a distance of fifty feet it was sixty feet higher. On this old surface the various geologists have collected material and all agree that it represents the oldest glacial period. This surface is one of the alleged "rock shelves" of the region; but is instead a dump in slack water and shown by well sections to be over 250 feet thick. It is allowed by all that the surface consists of Kansan drift, and it is also allowed that this surface was last deposited. It follows, therefore, that the earliest, or Kansan, drift was deposited after the Allegheny river had reached its present level. This is but one of hundreds of similar cases found for 200 miles along the Allegheny, and with streams under both glaciers—eastern and western—cut to present levels preglacially, the great antiquity of the ice age falls.

It may be asked, however, how the reversal of streams and cutting of cols are disposed of, as these are matters of considerable certainty.

When we consider that the ice advanced up stream in all cases over the northern Allegheny region, we can see that extreme high water would obtain and the water would pour over the cols into adjacent systems long before the actual presence of the ice at the spot. In fact, the actual presence at a given spot is unnecessary. If we next consider that the advancing ice would confront the loftiest part of our highlands, we can see that it would be aided in its efforts to produce high water by a large snow cap whose ablation would produce torrential conditions in all the drainage systems, and fill those systems with local trash, more or less rolled, which would saw down the cols over which the empounded waters escaped, long before the ice reached the region, and that when the glacier did make its appearance it would discharge into abnormally deep water. We have thousands of evidences from the north to the south of the State, in elevated beach lines, and similar remains, that the water exceeded 1600 feet above tide, and only on the highest mountain tops do we find unmodified till. In all other cases it is ordinary overwash or slack water modifications. The dead slack of the original water is shown throughout the region by the clean iceberg clay which sometimes reaches 100 feet in depth, and underlies all other deposits.

The matters touched upon here will be more fully discussed in the final report of the survey.

A NOTE ON THE HISTORY OF THE JEFFERSON MANUSCRIPT DRAUGHT OF THE DECLARATION OF INDEPENDENCE

IN THE LIBRARY OF THE AMERICAN PHILOSOPHICAL SOCIETY.

BY I. MINIS HAYS, M.D.

(Read April 1, 1898.)

As the precise historic relation of the Jefferson manuscript draught of the Declaration of Independence, possessed by this Society, to the document as adopted by the Congress, has been involved in some indefiniteness, it seemed desirable to collect and carefully examine all the information available on the subject.

The draught was acquired by the American Philosophical Society seventy-three years ago and the following entry appears in its Donation Book:

"1825, August 19.

"The draught of the Declaration of Independence originally presented to Congress. This venerable document was sent to R. H. Lee (the mover of the resolution of Independence) by Thos. Jefferson (in whose handwriting it appears to be, with the alterations made previous to the adoption by Congress) on the 8th [*sic*] July 1776 & has remained in Mr. Lee's family until the present time when his Grandson, R. H. Lee, gave it to the A. P. Soc'y to be added to the Documents presented on 17 June.[1] It was accompanied by a copy of Mr. Jefferson's letter enclosing it.

"*Donor.* Richd. Henry Lee, grandson of R. H. Lee by hands of G. W. Smith."

On the margin of the page is written:

"Received from the hands of Richard Henry Lee, Esq., by me and in pursuance of his request presented to the American Philosophical Society.

"GEORGE W. SMITH."

---

[1] The autograph correspondence of R. H. and A. Lee.

Below the entry of the donation and on the same page, the following certificate is written:

"Having examined the above Draught we certify it to be in the handwriting of Thos. Jefferson.

"Philad. 9 Sep. 1825.

"W. Short,
"Edward Coles,
"Jn. Vaughan."

"Who has been for 40 yrs.
Correspt. of T. J.

The document makes four, closely written pages on two sheets of white foolscap measuring 12½ × 7⅞ inches.

It appears to be a fair copy, originally without interlineations or erasures, of the Declaration as adopted by the Committee. The omissions made by the Congress sitting in Committee of the Whole are indicated by underscoring the parts omitted and where insertions were made by the Congress they are, for the most part, written on the margin, in a different hand from the body of the text, and, as will be subsequently seen, after the copy had been received by Lee.

The document was originally folded in four for convenience of transmittal and of filing, and at the top of the outside fold of the last sheet is written the following endorsement:

"Declaration of Independence as reported to Congress, July 1777" [*sic*].

At the bottom of the fourth and last page is written:

"The endorsement is in the handwriting of R. H. Lee, the alterations in that of Arthur Lee."

Jefferson's letter transmitting this manuscript copy of the Declaration to Richard Henry Lee, is as follows:

"To Richard Henry Lee:[1]

"Philadelphia, July 8th, 1776.

"*Dear Sir*:—For news, I refer you to your brother,[2] who writes on that head. I enclose a copy of the Declaration of Independence, as agreed to by the House, and also as originally framed. You will judge whether it is better or worse for the critics. I shall return to Virginia after the 11th of August. I wish my successor may be certain to come before that time: in that case, I shall hope to see you, and not Wythe, in convention, that the business of government, which is of everlasting concern, may receive your aid. Adieu, and believe me to be your friend and servant."

---

[1] From Lee's *Life of R. H Lee*, Vol. i, p. 275.

[2] Presumably Francis Lightfoot Lee, who was also a delegate from Virginia to the Congress and one of the Signers of the Declaration.

Jefferson evidently thought that the critics had not improved the document and so Lee understood him; for in his reply,[1] he says:

"CHANTILLY, 21 July, 1776.

"*Dear Sir:*

"I thank you much for your favor and its inclosures by this post, and I wish sincerely, as well for the honor of Congress, as for that of the States, that the manuscript had not been mangled as it is. It is wonderful, and passing pitiful, that the rage of change should be so unhappily applied. However, the *Thing* is in its nature so good that no Cookery can spoil the Dish for the palates of Freemen.

* * * * * * * * *

"It will always make me happy to hear from you because I am sincerely your affectionate friend,

"RICHARD HENRY LEE."

R. H. Lee, Jr., in his *Life* of his grandfather (p. 175) says of the copy thus enclosed, "The original was carefully preserved by Mr. Lee, not only for the interest he felt in its history, but for the great respect and warm friendship he felt for Mr. Jefferson. It has been as carefully preserved by his family, and finally committed to the author."

In this connection it should be recalled that the Virginia Convention, which convened at Williamsburg on the 6th of May, 1776, unanimously adopted on the 15th of the same month a preamble and resolutions, which were prepared by Pendleton, offered by Thomas Nelson, Jr., and powerfully advocated by Patrick Henry, to whom R. H. Lee wrote from Philadelphia on April 20th, exhorting him to propose in the Convention a separation from the mother country: "Ages yet unborn and millions existing at present," Lee wrote, "may rue or bless that assembly on which their happiness or misery will so eminently depend."[1] The preamble enumerated in strong terms the wrongs done to the United Colonies; the King's proclamation declaring them to be out of the protection of the Crown; and that there was no alternative but abject submission or a total separation. The first resolution was as follows:

---

[1] *Jefferson's MS. Papers*, 2d series, Vol. 51, 12, Library of Department of State, Washington.

"That the delegates appointed to represent this colony in the General Congress be instructed to propose to that respectable body to declare the United Colonies free and independent States, absolved from all allegiance to, or dependence upon, the crown or parliament of Great Britain, and that they give the assent of this colony to such declaration, and to whatever measures may be thought proper and necessary by the Congress for forming foreign alliances, and a confederation of the colonies, at such time and in the manner as to them shall seem best; *Provided*, the power of forming government for, and the regulations of the internal concerns of each colony, be left to the respective colonial legislatures."[2]

Richard Henry Lee, by appointment of the delegates from Virginia and in accordance with the instructions conveyed in this resolution, moved in the Congress on June 7, 1776:

"That these united colonies are, and of right ought to be, free and independent States; that they are absolved from all allegiance to the British crown, and that all political connection between them and the State of Great Britain is, and ought to be totally dissolved."

The resolution was seconded by John Adams, and was debated from the 7th to the 10th of June, Lee strenuously urging every argument in support of his motion. The Congress finally on the 10th of June ordered the further consideration of the resolution of independence to be postponed to the first day of July and "in the meanwhile, that no time be lost, in case the Congress agree thereto, that a committee be appointed to prepare a declaration to the effect of the said first resolution."

On the evening of that day, the 10th, Lee received by express intelligence of the dangerous illness of his wife at her home in Virginia. He immediately asked for leave of absence and left Philadelphia on the 11th, before the Committee was elected to draught

[1] *The Virginia Convention of 1776*, by Hugh Blair Grigsby, Richmond, 1855, p. 8.

[2] *Ibid.*, p. 17.

a declaration of independence. Lee's absence, which was of necessity to be of uncertain duration, precluded his being selected to serve on this Committee, in accordance with parliamentary practice, and as the resolution was offered under instructions from the Virginia colony, another of its representatives, Thomas Jefferson, was selected to head the Committee, with, as the other members, John Adams, the seconder of the resolution in the Congress, Franklin, Sherman and R. R. Livingston, the last representing those who thought that the time had not yet arrived for such an extreme measure.[1]

The Committee unanimously requested Jefferson to prepare the draught, but before reporting it to the Committee he communicated it separately to Dr. Franklin and Mr. Adams, because he says[2] "they were the two members whose judgments and amendments I wished most to have the benefit before presenting it to the Committee. . . . . Their alterations were two or three only, and mostly verbal. I then wrote a fair copy, reported it to the Committee, and from them unaltered, to Congress."

Jefferson reported the draught to the Congress on Friday, June 28, when it was read and ordered to lie on the table. On July 1, the Congress resolved itself into a Committee of the Whole and resumed the consideration of the original motion of Lee "respecting independency," which, after being debated through the day, was carried and was reported to the House and further consideration postponed to July 2, when it was adopted. The Congress, sitting in Committee of the Whole, then proceeded to the consideration of the Declaration reported by Jefferson, which had been referred to it on July 1, and examined, debated and amended it during the 2d, 3d and 4th of July.

Jefferson, in his *Autobiography*, says:[3] "The pusillanimous idea that we had friends in England worth keeping terms with still haunted the minds of many. For this reason, those passages which conveyed censures on the people of England were struck out, lest they should give them offense. The clause, too, reprobating the enslaving the inhabitants of Africa was struck out in complaisance to South Carolina and Georgia, who had never attempted to restrain the importation of slaves, and who, on the contrary, still wished to continue it. Our Northern brethren also, I believe, felt a little tender under these censures, for though their people had very few slaves themselves, yet they had been pretty considerable carriers of them to others."

---

[1] See E. Rutledge to John Jay, June 8, 1776, *Jefferson's Autobiography*, Ford's *Jefferson*, Vol. i, p. 19.

[2] Jefferson to J. Madison, August 30, 1823, Ford's *Jefferson*, i, p. 26. On this point see also *Autobiography of John Adams*, quoted by Ford, *ibid*, i, 24.

[3] Randolph's *Jefferson*, Vol. i, p. 15.

In the afternoon of the fourth the debate was closed and the Declaration as agreed to in the Committee of the Whole was reported by Mr. Harrison as Chairman of the Committee of the Whole and was adopted by the House.[1]

With the view of ascertaining more definitely the historic relation of the copy in the possession of this Society to the original draught, Mr. John Vaughan, the Librarian of the Society, upon the receipt of the document from Mr. Lee, wrote to Mr. Jefferson, asking him concerning this point, and received the following reply:[2]

"To JOHN VAUGHAN, ESQ.

"MONTICELLO, September 16, 1825.

"*Dear Sir:*—I am not able to give you any particular account of the paper handed you by Mr. Lee, as being either the original or a copy of the Declaration of Independence, sent by myself to his grandfather. The draught, when completed by myself, with a few verbal amendments by Dr. Franklin and Mr. Adams, two members of the Committee, in their own handwriting, is now in my own possession, and a fair copy of this was reported to the Committee, passed by them without amendment, and then reported to Congress. This latter should be among the records of the old Congress; and whether this or the one from which it was copied and now in my hands, is to be called the original is a question of definition. To that in my hands, if worth preserving, my relations with our University gives irresistible claims.

"Whenever in the course of the composition, a copy became overcharged, and difficult to be read with amendments, I copied it fair, and when that also was crowded with other amendments, another fair copy was made, etc. These rough draughts I sent to distant friends who were anxious to know what was passing. But how many, and to whom, I do not recollect. One sent to Mazzei was given by him to the Countess De Tessie (aunt of Madame de Lafayette) *as the original*, and is probably now in the hands of her family. Whether the paper sent to R. H. Lee was one of these, or whether, after the passage of the instrument, I made a copy for him, with the amendments of Congress, may, I think, be known from the face of the paper. The documents Mr. Lee has given you must be of great value and until all these private hoards are made public, the real history of the revolution will not be known."

---

[1] For a full review of the circumstances leading up to the Declaration and its adoption and signing, see Frothingham's *Rise of the Republic of the United States*, Boston, 1872.

[2] *The Writings of Thomas Jefferson*, edited by H. A. Washington, Vol. vii, New York, 1854, pp. 409, 410.

On April 24, 1840, in response to Mr. Vaughan's request Richard Henry Lee sent him the following statement:

"The Draught of the Declaration of Independence in the Athenæum [American Philosophical Society][1] in Philadelphia, in the handwriting of Mr. Jefferson, came into my possession, together with the MSS. of Richard Henry Lee from Francis L. Lee, one of the sons of R. H. Lee; and was presented by me to the Athenæum [American Philosophical Society] in Pha.

"The history of this Document, given to me by my father and his brother, as given them by their Father, R. H. Lee derived from Mr. Jefferson, is this, that after alterations had been made in the Committee of the first draught drawn by Mr. Jefferson, *he drew two Draughts, one to be reported to Congress;* and *the other for Richard H. Lee*, which he sent to him enclosed in a letter dated (I think) on the *8th July 1774* [*sic*]. This letter and the draught were carefully kept by R. H. Lee and after his death were as carefully preserved by his sons. Copies of the letter were taken; but the original had been lost, before the MSS. of R. H. Lee came into my hands. The copy which I presented to the Athenæum [American Philosophical Society] with the Draught, was declared to me by the sons of R. H. Lee, to be an exact copy. The Draught being drawn by Mr. Jefferson himself, before the report had been made to Congress, is as much *an Original*, as any other in existence. The interlineations on the Draught were written by Arthur Lee.

"Richard Henry Lee,

"A.D. 1840. Grandson and Biographer of R. H. Lee."

---

[1] Mr. Lee seems to have confused the American Philosophical Society with the Athenæum, which was a tenant in the building of the former at the time of Mr. Lee's visit to Philadelphia.

A careful study of the Lee manuscript copy in the possession of this Society clearly shows it to be the wording of the draught as reported by the Committee of five to the Congress. There is nothing to indicate whether it was a copy made by Jefferson at the same time that he made the fair copy to be reported to the Congress or later but prior to the writing of his letter of transmittal to Lee on July 8. Nor is there anything to prove whether the underscoring of the parts stricken out by the Congress was done by Jefferson or by some other hand at a later date, although Jefferson seems to have underscored these parts in all the fair copies he subsequently made of which we have knowledge.

Under the circumstances it was natural that Jefferson should send to Lee a copy of the Declaration so soon as it was agreed upon, and it seems therefore probable that when writing a fair copy to report to the Congress, and not anticipating any material alteration of it, he should, also, so as to lose no time, make another copy to send to Lee. As the Congress was sitting in secret session the necessity of maintaining all the safeguards of secrecy as to its pending deliberations prevented his forwarding this copy until after the adoption and promulgation of the Declaration. Then on the 8th of July, when he could, with propriety, send it, he found it necessary, because of the unexpected changes made by the Congress, to enclose also a copy of the text as finally adopted.[1]

Richard Henry Lee, Jr., in *The Life and Correspondence* of his grandfather, says (p. 175), that Jefferson in his letter of July 8, 1776, enclosed a copy of the Declaration as "drawn in the Committee and also a copy of the Declaration as adopted by Congress." This statement, taken in connection with the fact that the marginal notes of the changes by the Congress in this Society's copy were not made by Jefferson, but are in the handwriting of Arthur Lee, who was not in this country at any time during the year 1776, is in entire accord with that made by Jefferson in his letter of transmittal, in which he says, "I enclose a copy of the Declaration of Independence as agreed to by the House, and also as originally framed" and with Lee's reply thanking him for the "inclosure*s*."

---

[1] I have been unable to ascertain whether the copy of the text as adopted by the Congress was among the Lee papers presented to the University of Virginia, and if so, whether it was saved from the fire which destroyed its Library building in October, 1895. The Lee papers were contained in a trunk which, at the time of the fire, was thrown out of an upper window and broken by the fall. The papers were gathered up into a bundle and it is hoped none were lost, but until the new Library building is completed they cannot be examined.

If this manuscript copy had been made after the 4th of July it seems most likely that Jefferson would have copied the document as finally adopted by the Congress on that date, or at least would have indicated on the margin all the changes that had been made by the Congress. It also seems probable that the copy of the text as adopted by the Congress, enclosed by Jefferson for purpose of comparison, was a printed copy, as the document was by order of Congress[1] immediately put in print, and on the 5th the President transmitted copies, probably in the form of a broadside, to several assemblies,[2] and it appeared in *The Pennsylvania Evening Post*, for Saturday, July 6, 1776 (Vol. ii, No. 228); had it been another manuscript copy it would have been preserved by Lee with the same care as he gave to the one now in the possession of this Society. The accompanying copy could not have been the copy in the Emmet Collection now in the Lenox Library, hereafter to be referred to, which is said, also, to have belonged to "the Lee family," since that, too, is a copy of the draught as presented by the Committee and not as adopted by the Congress.

The marginal notes showing the additions to the text made by the Congress are evidently written by a different hand from the one that wrote the draught, and according to the endorsement, they were written by Arthur Lee. The handwriting appears to be his and I see no reason to doubt the correctness of the statement. Arthur Lee was in Europe, and had been there for some years, when the Declaration was adopted and did not return until September, 1780.[3] From which it would seem certain that at a date subsequent to this he and R. H. Lee compared the draught written by Jefferson with the document as passed by the Congress and marked the omissions and wrote on the margins the additions.

It is probable that the endorsement on the document was made some years after it was received, which may account for the erroneous date on it of "1777," which error would not be likely to have been made had it been written when received in 1776.

---

[1] "*Resolved*, That copies of the Declaration be sent to the several assemblies, conventions and committees or councils of safety, and to the several commanding officers of the continental troops; that it be proclaimed in each of the United States, and at the head of the army."

[2] Frothingham, *loc. cit.*, p. 544.

[3] See *Life of Arthur Lee*, by R. H. Lee, Vol. i, p. 164.

The conclusions I had reached concerning the draught belonging to this Society were subsequently confirmed by the following letter, written in the autumn of 1841, from John Vaughan to the Prince de Joinville, a copy of which I have recently found among the Society's unarranged manuscripts.

NOTE RELATIVE TO THE ORIGINAL DRAUGHT OF THE DECLARATION OF INDEPENDENCE OF THE UNITED STATES OF AMERICA, IN THE HANDWRITING OF THOMAS JEFFERSON AND NOW IN POSSESSION OF THE AMERICAN PHILOSOPHICAL SOCIETY AT PHILADELPHIA.

On the 7th day of June 1776 Richard Henry Lee moved in the American Congress "*That America should declare itself Independent of Great Britain;*" this motion was seconded by John Adams. The consideration of this motion was referred to 10th June. On that day Rich. Henry Lee received an account that his Wife was dangerously ill, obtained leave of absence from Congress and went home. On the 10th June, Congress proceeded to the Order of the day, and after some debate, postponed the further consideration of the question to the 1st July; but in order to save time, appointed a Committee to prepare a form of Declaration, to be ready for adoption, if then determined upon. The Committee named consisted of Mess. T. Jefferson, J. Adams, B. Franklin, Sherman & R. R. Livingston. Mr. Jefferson having been appointed Chairman of the above named Committee, it was assigned to him to prepare a Draught of the Declaration, (*the three first named were the most active members.*) The Draught was submitted to the Committee who suggested alterations. Amongst Mr. Jefferson's papers after his death there was found the Copy with the final corrections of his Associates from which a copy has been lithographed and appended to the Memoirs of Jefferson by his Grandson Thomas Randolph and a copy of this is preserved by the A. P. S. in a frame. *From this rough corrected Draught* Thomas Jefferson made Two fair Copies one to be submitted to Congress, as the report of the Committee, and one for Richard Henry Lee, the mover of Declaration, who did not return previous to the 1st July. The fair original Copy intended for Congress was reported to that body by Benjamin Harrison (father of the late President Harrison to whom it had been entrusted) on 1st July. Considerable alterations were made previous to its adoption which took place on 4th July. On the 8th July Mr. Jefferson wrote to Mr. Lee as follows. "*I enclose you a copy of the Declaration of Independence as agreed to by the House and also as originally framed.*" This was the Second copy which he had made for Mr. Lee. Mr. Jefferson added "*You will judge whether it is better or worse for the Critics.*" On the suggestion of Mr. Jefferson the Comparison was made by Richard Henry Lee and his Brother Arthur Lee, who drew a black line upon the *original draught proposed by the Committee* under every part rejected by Congress; and in the margin opposite placed the word *out.* This document thus marked is the one possessed by the Am. Philosophical Society.

Sometime after the death of Richard Henry Lee his Grandson, of the same name, wrote the memoirs of his Grandfather, having obtained from his Father and Uncle all the papers and correspondence of his Grandfather with the Eminent Patriots of that day. These memoirs were published in Philadelphia by the Grandson in 1825 with whom I was on terms of intimacy. Whilst publishing he was requested to favour the Am. Philos. Society with the original papers and Documents as soon as he had made use of them. The request was granted and on the 17th June 1825 they were put in possession of the correspondence which is bound up in two Volumes, and on the 19th of August 1825 R. H. L. sent them the original form proposed by the Committee, in the handwriting of Mr. Jefferson, and with the marks thereon made by the two Lees above alluded to. When received it was duly recorded by the Society and Mr. Wm. Short & Mr. Edward Coles who were intimate Friends of Mr. Jefferson and the undersigned who had been his Correspondent for more than 40 years Certified on the book of records, that this Document was of the handwriting of Mr. Jefferson; and Mr. George Washington Smith, to whom the delivery was entrusted, certified that he received the whole from Richard Henry Lee the Grandson, with directions to deliver them to the A. P. Society and that he delivered them to the undersigned for the Society.

A copy of this proposed Declaration was published by the Grandson in the memoirs of his Grandfather *the parts left out by Congress being printed in Italics;* several Editions of this *Italicised Copy* of 1825 were published between that year and 1829, when it was republished and Lithographed in similar form in the memoirs of Thomas Jefferson which was first published in that year.

This original draught of the declaration is framed between strong glass Plates so as to be perfectly viewed and examined by those who feel an interest in it. The other Original sent to Congress, cannot be found. The form of Declaration finally adopted, & signed by the Members of Congress exists at Washington in the Department of State, but the *originally proposed form has not been found*, from which circumstance the Document in possession of the Society has with propriety become the sole ORIGINAL DRAUGHT.

France having largely contributed to the obtaining this Independence, the undersigned (in whose charge this document now is) has been led to think that a correct account of it, and the mode by which it was obtained, would be received with some interest by his Royal Highness the Prince de Joinville, who has now an opportunity of examining it. Under this impression this account has been drawn up by

JN. VAUGHAN (aged 85)
Librarian of the Am. Phil. Society.

A letter identical with that to the Prince de Joinville, but with the last paragraph omitted, was also sent by Mr. Vaughan to Mr. J. K. Tefft, of Savannah, on October 5, 1841, and is now preserved in the Emmet collection in the Lenox Library in New York,[1] and previously, on March 27, 1841, he sent a letter of similar purport to Mr. George Combe, of Edinburgh,[2] in which he answers the charge of the *Edinburgh Review* (No. 141, p. 134, 1839) that he had hoaxed Captain Marryatt.

Captain Marryatt, in his *Diary in America*, page 43, Vol. iii, says, "Mr. Vaughan stated to me that he had found the *original draft* of the Declaration of Independence in the handwriting of Mr. Jefferson," and the *Edinburgh Review*, commenting thereon, states that if Captain Marryatt "had ever read that very interesting book (*Memoirs of Jefferson*, Vol. i, p. 17) he would have been aware how grossly a Mr. Vaughan, of Philadelphia, was *hoaxing* him when he talked of having discovered the original draught of the Declaration of Independence." Mr. Combe in his *Notes on the United States* (p. 330) says that "on my second visit to Philadelphia, in March, 1840, Mr. Vaughan enabled me to peruse original letters, giving its history from the day it was composed to that on which it was presented to the American Philosophical Society. . . . . Mr. Vaughan exhibited also a letter dated a few weeks before my visit from the son of Richard Henry Lee to himself, expressing his astonishment at the reviewer's remarks."

---

[1] For a copy of this letter I am indebted to the courtesy of Mr. Wilberforce Eames, Librarian of the Lenox Library.

[2] Copy in the Society's collection of MSS.

The letter of R. H. Lee, Jr., above referred to, is preserved in this Society's Manuscript Collections. It is dated, Washington, February 25, 1840, and is in reply to a letter from Mr. Vaughan of January 31, a copy of which is in the Dreer Collection of Autographs in the library of the Historical Society of Pennsylvania. In the course of the letter Mr. Lee says, "The Edinburgh Reviewer was *rather too* learned in our Antiquities. There was no hoax by you, on Marryatt. The paper you shewed him may be called with strict truth *an original Draught.* It is more so than that at Washington. It was written verbatim after the first rough Draft *of the Author*, by the Author himself. It is as much, therefore, *an original* Draught as it well can be, inasmuch as the priority in time as to the first *composed* paper is a matter of no account where the *same author writes at the same* time and occasion the two draughts. Neither are *copies.*"

The following copies of the Declaration of Independence in Jefferson's handwriting are known to exist:

1. The original rough draught showing changes made in Committee of five and also by parentheses and interlineations most of the changes made by the Congress in Committee of the Whole. This appears to have been the last draught made by Jefferson in its course through Committee, and from it he wrote the fair draught to present to the Congress as the report of the Committee and also the copy to send to Richard Henry Lee (2). He apparently used this same draught in Committee of the Whole and noted on it the changes as they were made by the Congress. This draught was first reproduced in *facsimile* in Randolph's *Jefferson.* It was acquired by the Government with the Jefferson papers and is now in the Library of the Department of State.

2. A copy of the draught reported by the Committee of five to the Congress and agreeing closely with the text of the preceding draught. This is one of two copies presumably made on or about the 27th of June, 1776; one was presented to the Congress as the report of the Committee of five and is believed not to have been preserved; the other is the copy in the possession of this Society, and was sent

by Jefferson to Richard Henry Lee on July 8th following, and presented in 1825, by his grandson, of the same name, to the American Philosophical Society, in whose library it is preserved.

3. A copy from the rough draught of the Committee of five, made in 1783 for James Madison and reproduced in *fac-simile* in *The Madison Papers*, Vol. iii., Washington, 1840. Also in the Library of the Department of State.

4. Another copy from the rough draught of the Committee of five, slightly different in wording, inserted by Jefferson in the manuscript copy of his *Autobiography*. This is written on contemporaneous paper and was a copy probably made by Jefferson not long after the adoption of the Declaration. Also in the Library of the Department of State.

5. A copy in the Emmet collection in the Lenox Library, New York. "This is one of several fair copies made by Jefferson from the original rough draught of the Declaration, after its adoption and publication, in which he gave the wording of the text as reported by the Committee, with the portions underlined that were changed or rejected by Congress. After remaining in the possession of the Lee family of Virginia for many years, with other papers of Jefferson, ... was sold by the late Mr. Cassius F. Lee, of Alexandria, to Mr. Elliot Danforth, of New York, from whom Dr. Emmet obtained it."[1]

I have not been able to learn the circumstances under which this copy came into the possession of the Lee family. Dr. Emmet writes me that the only information he "can give is that Mr. Lee stated to me that it was one of the copies Jefferson sent his grandfather, and that it had been sent to some one in lower Virginia by Richard Henry Lee shortly after, and that it was not recovered for many years after."[2]

This copy is without interlineation and does not contain the additions made by the Congress. It is, with some slight exceptions, the text of the document as reported to the Congress.

---

[1] *Bulletin of the New York Public Library*, 1897, p. 355.

[2] Personal communication, April 16, 1898. It does not seem likely that Jefferson should have sent two similar autographic copies of the Declaration to Richard Henry Lee, and as the history of the copy possessed by this Society is clear and indisputable, it is probable that the Emmet copy came from another source, and Mr. Paul L. Ford, the learned student of Jefferson's works, informs me that he is inclined to believe that it is the copy sent to John Page.

6. A fragment of a copy in the possession of Mrs. Washburn, of Boston.

In addition to these five copies and a fragment of a sixth, Jefferson made, according to Ford,[1] between the 4th and 10th of July, other copies, which he sent to George Wythe,[2] John Page, Edmund Pendleton and Philip Mazzei, who gave his copy, so Jefferson states in his letter to Vaughan, to the Countess de Tessé, of France, but it is not known if these copies are still in existence.

The copy of the draught of the Declaration presented, as its report, by the Committee of five of which Jefferson was Chairman, to the Congress cannot be found and is believed not to have been preserved.[3] It was probably read in the Congress and passed into the hands of the Secretary, who used it in writing in the amendments as they were adopted during consideration of the document in the Committee of the Whole and, upon its adoption by the House, at once sent it to the printer as copy and it was subsequently destroyed.

If these conclusions and the statement previously referred to of R. H. Lee, the elder, to his son, be correct, the historic value of the draught possessed by this Society lies in the fact, apart from its being an autographic copy by Jefferson, that it is one of the two fair copies made at the same time by Jefferson, one to report to the Congress, the other to send to Lee. As the copy presented to the Congress has been lost, the copy sent to Lee, and now belonging to this Society, must be regarded as the authoritative text of the Declaration of Independence as drawn by the Committee of five and reported to the Congress.

---

[1] *Writings of Jefferson*, ii, p. 42, Note.

[2] This copy was delivered to Mr. Thomas Ritchie, editor of the *Richmond Enquirer*, by Major Duval, the executor of Mr. Wythe's estate, and its text was printed in Niles's *Weekly Register*, July 3, 1813 (Vol. iv, No. 13). Notwithstanding inquiry among Mr. Ritchie's descendants I have not been able to learn whether it is still in existence.

[3] In the "Rough Journal" of Congress kept by the Secretary, Charles Thomson, appears the entry under July 4, "The Declaration being again read was agreed to as follows." Here the printed Declaration, a broadside with the imprint: "Philadelphia: Printed by John Dunlap," is attached by wafers. In the fair copy of the "Rough Journal" the Declaration is written out at length in the same handwriting as the rest of the Journal. See Chamberlain, "The Signing of the Declaration," *Proceedings of Massachusetts Historical Society*, 2d Series, Vol. I, p. 286.

The text of the draught possessed by this Society and a *fac-simile* of it are appended :[1]

[A Declaration by the Representatives of the UNITED STATES OF AMERICA in General Congress assembled.] *In Congress, July 4, 1776, The Unanimous Declaration of the thirteen United States of America.*

When in the course of human events it becomes necessary for one people to dissolve the political bands which have connected them with another, and to assume among the powers of the earth the separate and equal station to which the laws of nature and of nature's god entitle them, a decent respect to the opinions of mankind requires that they should declare the causes which impel them to the separation.

We hold these truths to be self-evident; that all men are created equal; that they are endowed by their Creator with [inherent and inalienable] *certain unalienable* rights; that among these are life, liberty, and the pursuit of happiness; that to secure these rights, governments are instituted among men, deriving their just powers from the consent of the governed; that whenever any form of government becomes destructive of these ends, it is the right of the people to alter or to abolish it, and to institute new government, laying its foundation on such principles, and organizing its powers in such form as to them shall seem most likely to effect their safety and happiness. Prudence indeed will dictate that governments long established should not be changed for light & transient causes, and accordingly all experience hath shown that mankind are more disposed to suffer, while evils are sufferable, than to right themselves by abolishing the forms to which they are accustomed. But when a long train of abuses and usurpations, [begun at a distinguished period &] pursuing invariably the same object, evinces a design to reduce them under absolute despotism, it is their right, it is their duty, to throw off such government, & to provide new guards for their future security. Such has been the patient sufferance of these colonies, & such is now the necessity which constrains them to [expunge] *alter* their former systems of government. The history of the present king of Great Britain is a history of [unremitting] *repeated* injuries and usurpations, [among which appears no solitary fact to contradict the uniform tenor of the rest; but] all [have] *having* in direct object the establishment of an absolute tyranny over these states. To prove this let facts be submitted to a candid world, [for the truth of which we pledge a faith yet unsullied by falsehood].

---

[1] The text is printed in Roman characters. In order to show the changes made by the Congress the parts stricken-out by the Congress are enclosed in [brackets], and the parts inserted by the Congress are printed in *Italics*.

He has refused his assent to laws the most wholesome and necessary for the public good.

He has forbidden his governors to pass laws of immediate & pressing importance, unless suspended in their operation till his assent should be obtained; and when so suspended, he has [neglected utterly] *utterly neglected* to attend to them.

He has refused to pass other laws for the accommodation of large districts of people, unless those people would relinquish the right of representation in the legislature; a right inestimable to them, & formidable to tyrants only.

He has called together legislative bodies at places unusual, uncomfortable, & distant from the depository of their public records, for the sole purpose of fatiguing them into compliance with his measures.

He has dissolved Representative houses repeatedly [& continually], for opposing with manly firmness his invasions on the rights of the people.

He has refused for a long time after such dissolutions to cause others to be elected whereby the legislative powers, incapable of annihilation, have returned to the people at large for their exercise, the state remaining in the meantime exposed to all the dangers of invasion from without, & convulsions within.

He has endeavored to prevent the population of these states; for that purpose obstructing the laws for naturalization of foreigners; refusing to pass others to encourage their migrations hither; & raising the conditions of new appropriations of lands.

He has [suffered the administration of justice totally to cease in some of these states] *obstructed the administration of justice by* refusing his assent to laws for establishing judiciary powers.

He has made [our] judges dependant on his will alone, for the tenure of their offices, and the amount & paiment of their salaries.

He has erected a multitude of new offices [by a self-assumed power] & sent hither swarms of officers to harrass our people, and eat out their substance.

He has kept among us, in times of peace, standing armies [and ships of war,] without the consent of our legislatures.

He has affected to render the military independant of, & superior to, the civil power.

He has combined with others to subject us to a jurisdiction foreign to our constitution[s] and unacknowledged by our laws; giving his assent to their acts of pretended legislation

for quartering large bodies of armed troops among us;

for protecting them by a mock-trial from punishment for any murders which they should commit on the inhabitants of these States;

for cutting off our trade with all parts of the world;

for imposing taxes on us without our consent;

for depriving us *in many cases* of the benefits of trial by jury;

for transporting us beyond seas to be tried for pretended offences;

for abolishing the free system of English laws in a neighboring province, establishing therein an arbitrary government, and enlarging its boundaries so as to render it at once an example & fit instrument for introducing the same absolute rule into these [States] Colonies;

for taking away our charters, abolishing our most valuable laws, and altering fundamentally the forms of our governments;

for suspending our own legislatures, & declaring themselves invested with power to legislate for us in all cases whatsoever.

He has abdicated government here, [withdrawing his governors, &] *by* declaring us out of his [allegiance and] protection, *and waging war against us.*

He has plundered our seas, ravaged our coasts, burnt our towns, & destroyed the lives of our people.

He is at this time transporting large armies of foreign mercenaries, to compleat the works of death, desolation & tyranny, already begun with circumstances of cruelty and perfidy *scarcely paralleled in the most barbarous ages and totally* unworthy the head of a civilized nation.

He has *excited domestic insurrections among us, and has* endeavored to bring on the inhabitants of our frontiers the merciless Indian savages, whose known rule of warfare is an undistinguished destruction of all ages, sexes, and conditions [of existence].

[He has incited treasonable insurrections of our fellow citizens with the allurements of forfeiture & confiscation of our property.]

He has constrained [others] *our fellow citizens* taken captive[s] on the high seas, to bear arms against their country, to become the executioners of their friends and brethren, or to fall themselves by their hands.

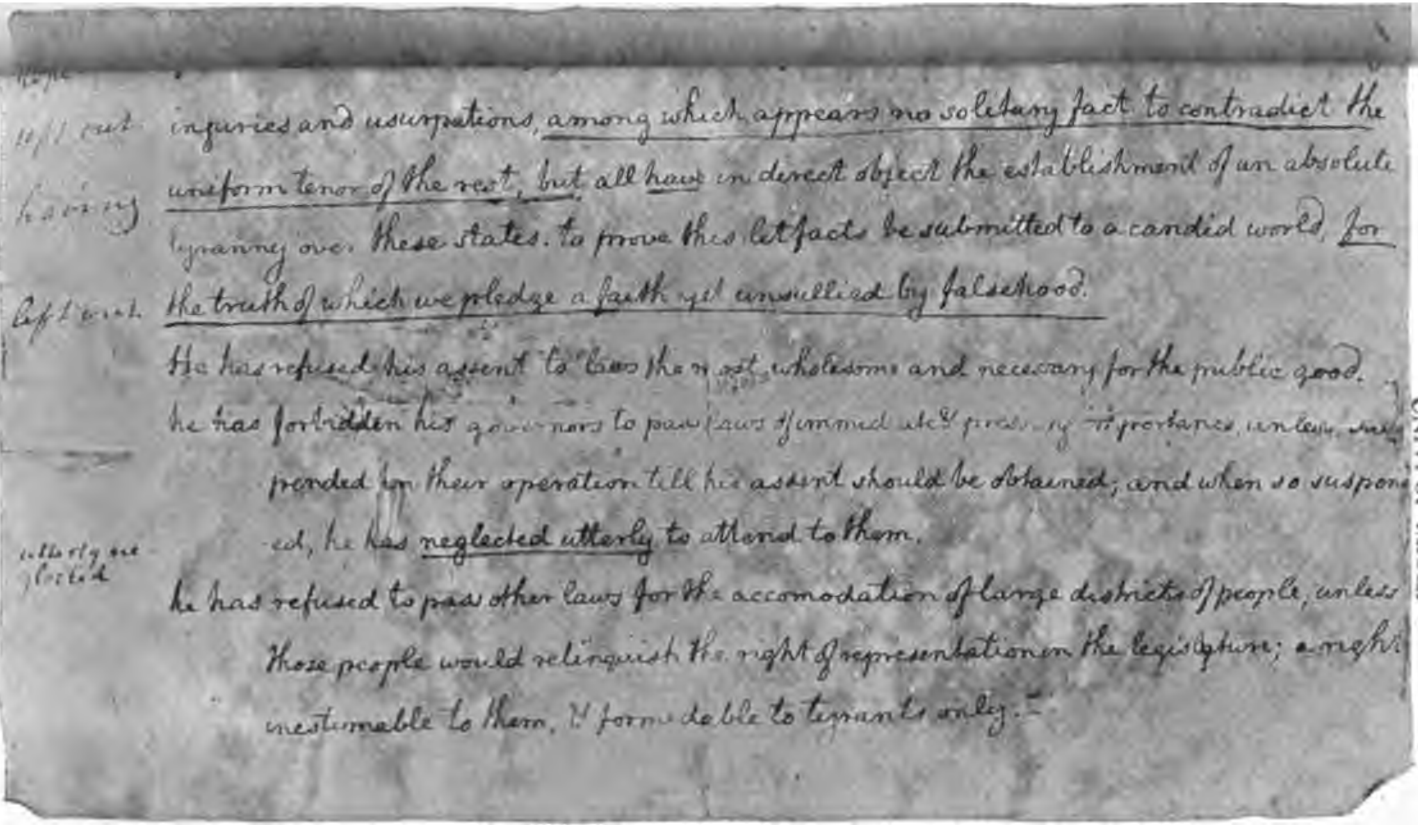
[He has waged cruel war against human nature itself, violating its most sacred rights of life & liberty in the persons of a distant people, who never offended him, captivating and carrying them into slavery in another hemisphere, or to incur miserable death in their transportation thither. This piratical warfare, the opprobrium of infidel[1] powers, is the warfare of the Christian[1] king of Great Britain. Determined to keep open a market where MEN should be bought & sold, he has prostituted his negative for suppressing every legislative attempt to prohibit or to restrain this execrable commerce: and that this assemblage of horrors might want no fact of distinguished die, he[1] is now exciting those very people to rise in arms among us, and to purchase that liberty of which he[1] has deprived them, by murdering the people upon whom he[1] also obtruded them: thus paying off former crimes committed against the liberties[1] of one people, with crimes which he urges them to commit against the lives[1] of another,]

In every stage of these oppressions, we have petitioned for redress in the most humble terms; our repeated petitions have been answered only by repeated injury. A prince whose character is thus marked by every act which may define a tyrant, is unfit to be the ruler of a *free* people [who mean to be free. Future ages will scarce believe that the hardiness of one man adventured within the short compass of twelve years only, to build a foundation, so broad and undisguised, for tyranny over a people fostered and fixed in principles of freedom.]

Nor have we been wanting in attentions to our British brethren. We have warned them from time to time of attempts by their legislature to extend [a] *an unwarrantable* jurisdiction over [these our states] *us*. We have reminded them of the circumstances of our emigration and settlement here, [no one of which could warrant so strange a pretension: that these were effected at the expence of our own blood and treasure, unassisted by the wealth or the strength of Great Britain: that in constituting indeed our several forms of government, we had adopted one common king, thereby laying a foundation for perpetual league and amity with them: but that submission to their parliament was no part of our constitution, nor ever in idea, if history may be credited: and] we *have* appealed to their

---

[1] Underscored in original.



left out injuries and usurpations, among which appears no solitary fact to contradict the

having uniform tenor of the rest, but all have in direct object the establishment of an absolute

tyranny over these states. to prove this let facts be submitted to a candid world, for

left out the truth of which we pledge a faith yet unsullied by falsehood.

He has refused his assent to laws the most wholesome and necessary for the public good.

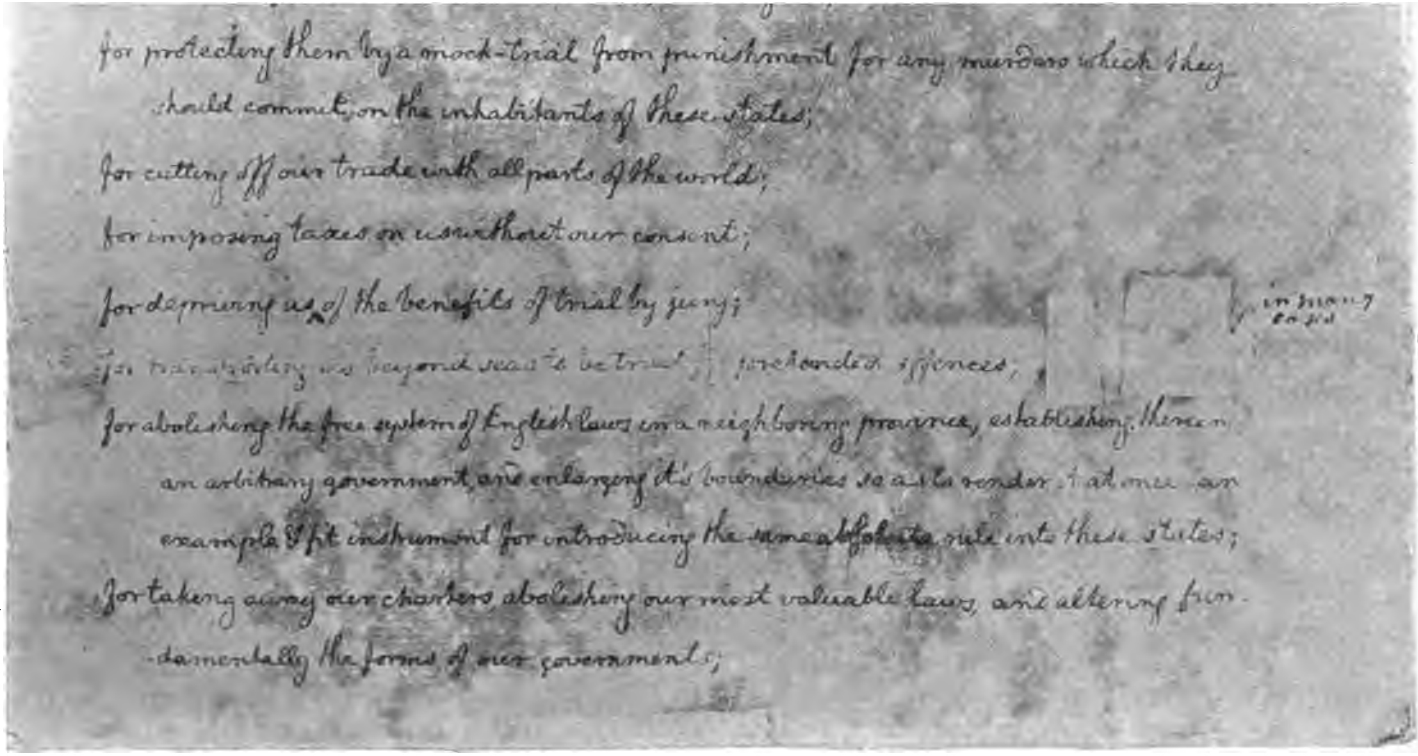
he has forbidden his governors to pass laws of immediate & pressing importance, unless suspended in their operation till his assent should be obtained; and when so suspended, he has neglected utterly to attend to them.

utterly neglected

he has refused to pass other laws for the accomodation of large districts of people, unless those people would relinquish the right of representation in the legislature; a right inestimable to them, & formidable to tyrants only.

GENERAL LIBRARY, UNIV. OF MICH.

GENERAL LIBRARY,
UNIV. OF MICH.



for protecting them by a mock-trial from punishment for any murders which they
should commit on the inhabitants of these states;
for cutting off our trade with all parts of the world;
for imposing taxes on us without our consent;
for depriving us ^ of the benefits of trial by jury; in many cases
for transporting us beyond seas to be tried for pretended offences;
for abolishing the free system of English laws in a neighboring province, establishing therein
an arbitrary government, and enlarging it's boundaries so as to render it at once an
example & fit instrument for introducing the same ~~absolute~~ rule into these states;
for taking away our charters, abolishing our most valuable laws, and altering fun-
damentally the forms of our governments;

V
is
st
e
st
o
G
g
fc
m
in

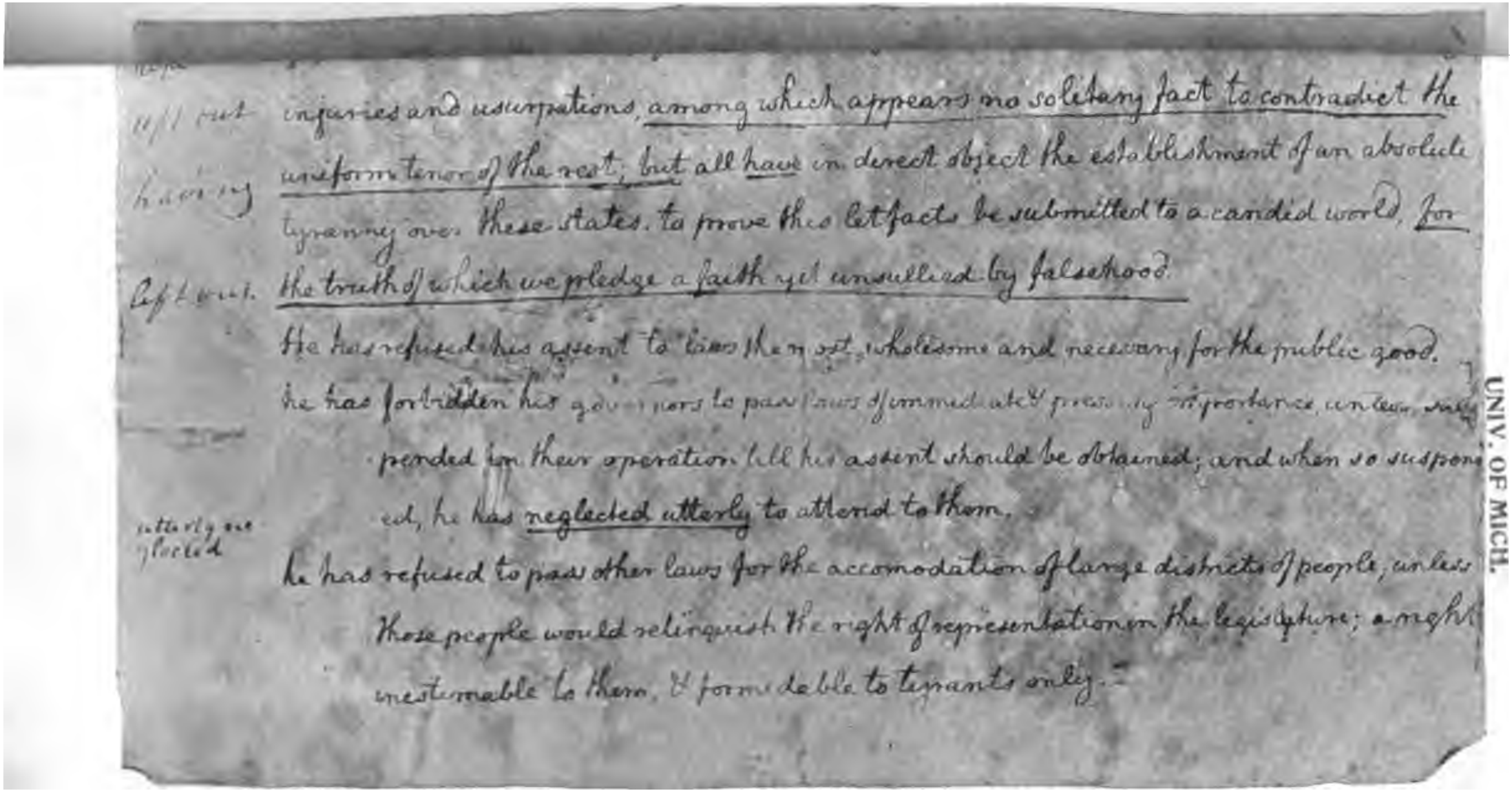
obtruded them: thus paying off former crimes committed against the liberties of one people with crimes which he urges them to commit against the lives of another.

In every stage of these oppressions we have petitioned for redress in the most humble terms; our repeated petitions have been answered only by repeated injury. a prince whose character is thus marked by every act which may define a tyrant, is unfit to be the ruler of a people who mean to be free. future ages will scarce believe that the hardiness of one man adventured within the short compass of twelve years only to build a foundation, so broad and undisguised, for tyranny over a people fostered and fixed in principles of freedom.

of a free
people

[illegible]

We therefore the Representatives of the United States of America in General
appealing to the supreme Judge of the world for the rectitude of our intentions,
Congress assembled, do in the name & by authority of the good people of these states, reject Colonies,
and renounce all allegiance and subjection to the kings of Great Britain & all others
who may hereafter claim by, through, or under them; we utterly dissolve all political con-
nection which may heretofore have subsisted between us & the parliament or people
[illegible] ~~con~~ [illegible] finally [illegible] these colonies [illegible] free & independent
states, & that as free & independant states they have full power to levy war, conclude peace,
contract alliances, establish commerce, & to do all other acts and things which inde-
pendant states may of right do. And for the support of this declaration we mutually
pledge to each other our lives our fortunes, and our sacred honor.
[illegible] the [illegible]
[illegible]



left out injuries and usurpations, among which appears no solitary fact to contradict the

having uniform tenor of the rest; but all have in direct object the establishment of an absolute

tyranny over these states. to prove this let facts be submitted to a candid world, for

left out. the truth of which we pledge a faith yet unsullied by falsehood.

He has refused his assent to laws the most wholesome and necessary for the public good.

he has forbidden his governors to pass laws of immediate & pressing importance, unless sus-

pended in their operation till his assent should be obtained; and when so suspend-

utterly neglected ed, he has neglected utterly to attend to them.

he has refused to pass other laws for the accomodation of large districts of people, unless

those people would relinquish the right of representation in the legislature; a right

inestimable to them, & formidable to tyrants only.

GENERAL LIBRARY, UNIV. OF MICH.

FAC-SIMILE OF THE JEFFERSON AUTOGRAPH DRAUGHT OF THE DECLARATION OF INDEPENDENCE IN THE POSSESSION OF THE AMERICAN PHILOSOPHICAL SOCIETY

native justice & magnanimity, [as well as to] ***and we have conjured them by*** the tyes of our common kindred, to disavow these usurpations, which [were likely to] ***would inevitably*** interrupt our connection & correspondence. They too have been deaf to the voice of justice, and of consanguinity; [and when occasions have been given them, by the regular course of their laws, of removing from their councils the disturbers of our harmony, they have by their free election reestablished them in power. At this very time too, they are permitting their chief magistrate to send over not only soldiers of our common blood, but [Scotch and] foreign mercenaries to invade and destroy us. These facts have given the last stab to agonizing affection; and manly spirit bids us to renounce forever these unfeeling brethren. We must endeavor to forget our former love for them, and to hold them as we hold the rest of mankind, enemies in war, in peace friends. We might have been a free & a great people together; but a communication of grandeur and of freedom, it seems, is below their dignity. Be it so, since they will have it. The road to happiness and to glory is open to us too; we will climb it apart from them and] ***we must therefore*** acquiesce in the necessity which denounces our [eternal] separation [!] ***and hold them, as we hold the rest of mankind, Enemies in War, in Peace Friends.***

We therefore the Representatives of the United States of America in General Congress assembled, ***appealing to the Supreme Judge of the world for the rectitude of our intentions*** do, in the name, & by authority of the good people of these [states, reject and renounce all allegiance and subjection to the kings of Great Britain, and all others who may hereafter claim by, through, or under them; we utterly dissolve all political connection which may heretofore have subsisted between us and the parliament or people of Great Britain, and finally we do assert these] Colonies, ***solemnly publish and declare that these United Colonies are and of Right ought*** to be free and independant states; ***that they are Absolved from all allegiance to the British Crown, and that all political connection between them and the State of Great Britain, is and ought to be totally dissolved;*** & that as free & independant states, they have full power to levy war, conclude peace, contract alliances, establish commerce, & to do all other acts and things which independant states may of right do. And for the support of this declaration, ***with a firm reliance on the protection of divine Providence,*** we mutually pledge to each other our lives, our fortunes, and our sacred honor.

THE GENESIS OF BITUMENS, AS RELATED TO CHEMICAL GEOLOGY.

BY S. F. PECKHAM.

(*Read April 1, 1898.*)

1. On the 5th of February, 1897, a symposium was held at the rooms of the American Philosophical Society in Philadelphia, upon "The Origin and Nature of Petroleum." It was conducted by Profs. S. P. Sadtler and Charles F. Mabery, Dr. D. T. Day, of Washington, D. C., Francis C. Phillips and the writer. While listening to the papers then read, I was impressed with the fact that the discussion proceeded almost wholly without regard to any consideration of the different conditions that probably obtained in that primitive world in which the oldest petroleums found their origin. Prof. Mabery discussed, from the standpoint of pure chemistry, the composition of the petroleums of the Trenton limestone; I, myself, those of the Miocene Tertiary of California; Dr. Sadtler, the extremely interesting experiments that he had made upon the destructive distillation of the glycerides of linseed oil; while Dr. Day discoursed upon the somewhat remote and problematic resultant of certain chemical reactions upon bitumen; and Mr. Phillips presented some exceedingly interesting theoretical considerations concerning "The Genesis of Petroleum and Natural Gas" and "The Occurrence of Petroleum in the Cavities of Fossils." Later reflection has brought very forcibly to my mind considerations that I am led to present as a possible means of reconciling many of the differences that appear in the late discussion of these questions.[1]

2. In view of the general acceptance of the nebular hypothesis, it is unnecessary to establish the fundamental proposition that bitumens, as minerals, are properly considered in their relation to all the other mineral species that have been identified and described as together constituting the earth's crust. The clear distinction of these relations has followed upon many years of research along several lines. It began more than a century ago with the famous discussion waged between the Plutonists and Neptunists, as to whether fire or water had been most active in producing the phe-

---

[1] PROC. AMER. PHIL. SOC., xxxvi, No. 154.

nomena of rock building. Mineral silicates were then supposed to have crystallized from igneous fusion, and the deposition of sediments to have resulted only in amorphous, uncrystallized rocks. The idea that heat and water together may have produced all of the phenomena that have been attributed to the action of either alone has been of slow growth; but may now be said to be pretty generally accepted, although there are those who refer to the action of heat and of pressure alone phenomena that are without doubt properly the resultant of the action of heat and steam under pressure.

3. The discussions that have proceeded along the three lines of geology, chemistry and mineralogy, have been mainly directed to an elucidation of the problems relating to the formation of the crystalline rocks. To determine, therefore, the nature of metamorphic action and the conditions under which it might take place, was the problem to the solution of which Bischof, Hunt, Delesse, Daubrée and several others of the most gifted chemical geologists of this century devoted themselves.[1] These gentlemen first considered the reactions that according to known chemical laws must follow the cooling of a heterogeneous mixture of the elements composing the earth, in a state of gaseous fluidity, and at a temperature that rendered chemical combination impossible; in other words, a state of complete dissociation. It follows that the most infusible elements would first condense and form a solid nucleus around which would float an ocean, in a state of igneous fusion, of more fusible elements and compounds, while over all would hover an atmosphere containing all the nitrogen and oxygen, the free hydrogen, sulphur and allied elements, with the chlorine and other halogens. As the cooling proceeded the silicon would combine with oxygen and bases, forming both acid and basic silicates, which would constitute a solid crust. The hydrogen and haloids combining would form the haloid acids and the sulphur and allied elements would form oxygen acids, all the hydrogen being oxidized into water, which with the acids would be alternately condensed and evaporated, falling as an acid rain upon the surface of silicated rocks, which in turn

---

[1] G. Bischof, *Chem. and Phys. Geology*, Cav. Soc. ed. T. S. Hunt, *Chem. and Geolog. Essays*. Delesse, "Essay on Pseudomorphs," *Ann. des Mines*, xii, 509; xiii, 393, 415; xvi, 317–392. *Mem. Acad. de Scien. de France*, xvii. Daubrée, *Comptes Rendus de l'Acad.*, November 16, 1857. *Études et experiences synthétique sur le Métamorphisme*, Paris, 1859.

would emerge from the ocean of water heavy with dissolved chlorides and sulphates, while an atmosphere dense with carbonic acid would help to maintain a temperature that would retard the cooling through vast cycles of geologic time, in the course of which, under conditions entirely different from any now known, vegetable and animal life would appear upon the earth, or, more properly, in the waters that covered the earth.

4. It is very evident that the chemical conditions obtaining in this remote geologic epoch, while not incompatible with the development of life, were, however, very different from those which have prevailed at any time since the advent of any of the higher forms of animals. We have a right to believe that at the dawn of life, of all the elements that enter into the composition of vegetable and animal tissue—carbon, hydrogen, oxygen, nitrogen, phosphorus and sulphur—nitrogen alone was wholly free. Carbon and hydrogen existed in combination with oxygen as carbonic acid and water. Phosphorus and sulphur were oxidized, and in combination with basic elements as salts. The excessive proportion of carbonic acid and aqueous vapor in the atmosphere gave to it the property of transcalesence, by which, while readily penetrated by heat from the sun, it refused to transmit this heat when reflected from objects at the earth's surface. This gave to the atmosphere properties similar to those of a greenhouse, by which so high a temperature was maintained during the coal period that semitropical plants flourished at the poles. At an earlier period, before terrestrial vegetation had removed the carbonic acid from the air, and before the surface of the cooling earth had lost its heat by radiation, the palæozoic (dawn of life) ocean and the land gave support to both vegetable and animal life, at a temperature that at the present time would destroy most organic forms.[1]

5. The strata which form that portion of the earth's crust which has been referred to the palæozoic era, are of enormous thickness and are found in different parts of the world, to present aspects strikingly similar. Messrs. Hall, Billings and Dawson, in North America, Salter and Hicks in England, Angelin in Sweden, and Barrande in Bohemia, have shown that the forms of animal life in that early period were very closely related, if not identical, in these widely separated areas; yet, below these formations, which hold the

---

[1] W. H. Brewer, *Am. Jour. Sci.* (2), xli, 389.

remains of marine animals, in Bohemia and Sweden if not elsewhere, there is a "region of fucoids," of great thickness, carrying back the dawn of vegetable life to a still more remote epoch.[1] Throughout the last fifty years, successive discoveries of fossils in strata hitherto supposed to be destitute of organic remains, have carried the apparent dawn of life back through successive geological formations, until the azoic (devoid of life) rocks have ceased to be appropriately named, and Mr. Hicks, speaking of the Cambrian fauna of Wales, says, "Though animal life was restricted to these few types, yet at this early period the representatives of the different orders do not show a very diminutive form, or a markedly imperfect state; nor is there an increased number of blind species. The earliest known brachiopods are apparently as perfect as those which succeed them; and the trilobites are of the largest and best developed types. The fact also that trilobites had attained a maximum size at this period, and that forms were present representative of almost every stage of development, ... blind genera along with those having the largest eyes, leads to the conclusion that for these several stages to have taken place numerous previous faunas must have had an existence, and, moreover, that even at this time in the history of our globe an enormous period had elapsed since life first dawned upon it."[2]

6. The formations that contain these earliest palæozoic forms of life are now found for the most part in a crystalline condition; yet, Dr. Hunt affirms, "that the oldest known rocks are stratified deposits of limestone, clay and sands, generally, in a highly altered condition; . . . . it is, however, quite certain that the advent of life in these oldest fossiliferous strata was subsequent to the period of chemical reactions on a cosmic scale."[3] The manner in which these geological formations and parts of formations may have been rendered crystalline has been very exhaustively discussed by Dr. Hunt in his chemical and geological essays. He has shown

---

[1] James Hall, *Paleontology of New York*, Vol. iii, Introduction. Billings, *Am. Jour. Sci.* (2), xxxii, 232. *Reports Geological Survey of Canada*, v. d. Dawson, *Canadian Naturalist*, v. d. *Reports Geological Survey of Canada*, v. d. Salter and Hicks, *Proc. Geol. Assoc.*, *Quar. Jour. Geolog. Soc.*, v. d. Angelin, *Palæontologica Scandinavica*. Barrande, *Bul. Soc. Geol. de France* (2), xvi, 529–545.

[2] Hicks, *Quar. Jour. Geol. Soc.*, May, 1872.

[3] *Chemical and Geological Essays*, ed. 1875, p. 2.

how fully his conclusions, based almost wholly on theoretical considerations, have been confirmed by the experiments of Daubrée, who was led to investigate this subject, from observing that the action of the alkaline, thermal waters of the spring at Plombières, at a temperature of 60°–70° C., had in the course of centuries given rise to the formation of zeölites and other silicated minerals among the bricks and cement of the old Roman baths.[1] He further shows that at a temperature of 100° C. silicates are produced from a reaction between alkaline silicates and carbonates of lime, magnesia and iron. He says further, "Now the supposed mode of formation of the primitive molten crust of the earth would naturally exclude all combined or intermingled water, while all the sedimentary rocks are necessarily pervaded by this liquid, and are consequently in a condition to be rendered semifluid by the application of heat. . . . . If now, we admit that all igneous rocks, ancient plutonic masses as well as molten lavas, have their origin in the liquefaction of sedimentary strata we at once explain the diversities of their composition. . . . . The presence of fossil plants in the melting strata would generate carburetted hydrogen gases, whose reducing action would convert the sulphurous acid into suphuretted hydrogen; or the reducing agency of the carbonaceous matter might give rise to sulphuret of calcium, which would be, in its turn, decomposed by the carbonic acid or otherwise. . . . . The carburetted hydrogen and bitumen evolved from mud volcanoes, like those of the Crimea and Baku, and the carbonized remains in the *moya* of Quito, and in the volcanic matters of the island of Ascension, not less than the infusorial remains found by Ehrenberg in the ejected matters of most volcanoes, all go to show that fossiliferous sediments are very generally implicated in volcanic phenomena."[2] Again, he states, that in a letter to Sir Charles Lyell, dated February 20, 1836, Sir John F. W. Herschel maintains that with the accumulation of sediments the isothermal lines of the earth's crust must rise, so that strata buried deep enough will be crystallized and metamorphosed, and eventually be raised with their included water to the melting point." Again Dr. Hunt says, "We conceive that the earth's solid crust of anhydrous and primitive rock is everywhere deeply concealed beneath its own ruins, which form a great mass of sedimentary strata, permeated by water. As heat invades these sediments, it produces in them that change which constitutes normal metamorphism. These rocks at a sufficient depth are necessarily in a state of igneo-aqueous fusion, and in the event of fracture of the overlying strata may rise among them taking the form of eruptive rocks."[1] He calls the effects produced by such invasion of eruptive masses, local metamorphism. From these extracts from several of Dr. Hunt's essays, it can be easily understood that a struggle has been in progress from the time of the oldest known rocks to the present, between the shrinking and wrinkling crust of a cooling earth and the thickening deposits of sediment accumulating from its erosion.

---

[1] *Études et éxperiences synthétique sur le métamorphisme*, par M. A. Daubrée, Paris, 1859, p. 98; *Ann. des Mines* (5), xiii, 227.

[2] *Essays*, p. 8.

7. One Sunday in the early summer of 1866, I found myself with Dr. George L. Goodale, now of Harvard University, stranded at a small hostelry, at the San Fernando Pass, near the old Mission of San Fernando, in southern California. The day was very fine and we chose a morning climb to anything the hostelry had to offer; so, mounting our horses, we rode to the eastward over the flood plain of pulverized rock that at some former period had poured out of the great cañon back of where the town of Burbank now stands. We climbed one of the spurs of the San Rafael range to the west of the cañon. We first passed over rounded hillocks of sandy soil which as we ascended became gradually merged into soft fossiliferous sandstone. After a time the effects of heat became manifest. The clam shells and fossil clams, of which there were cart-loads, appeared crystalline, and the iron in the sand was no longer green but red. The sandstones became more dense and the clays were silicated. At length the strata passed into a micaceous gneiss and finally we found the central core of the mountain to be a light-colored fine-grained granite. About half way up, Dr. Goodale found a vertebra of a whale half buried in the sandstone and still very perfect in form, while I found a fossil pine cone that had evidently received some rough usage on the ancient beach. This cone contained some seeds that showed it to be closely allied to the nut pine of New Mexico. The mountain consisted wholly of Tertiary sediments that had been metamorphosed precisely as Sir J. F. W. Herschel had suggested in his letter to Sir Charles Lyell.

---

[1] *Essays*, p. 9.

8. It is not alone through a study of the crystalline rocks that the chemistry of the primeval world is interpreted. By a comparison of the kind and amount of salts dissolved in the waters of the primeval ocean that are enclosed in palæozoic strata with the kind and amount of salts dissolved in the waters of the present ocean, Dr. Hunt has shown that from the earliest geologic time until the present, alkaline carbonates derived from the subaërial decomposition of feldspar have been carried into the ocean by streams, and the calcium and magnesium in the ocean have been successively precipitated as carbonates, producing limestones and dolomites, while common salt and calcium sulphate have accumulated in the present ocean, the former in large excess. There is abundant evidence that this palæozoic ocean was hotter than the existing one, as well as more saline, while it is equally evident that during long intervals its sediments carried down vast quantities of the remains of vegetable and animal life. He has further repeatedly shown in what manner these sediments were influenced by the organic matters that were enclosed in them. In his essay on "The Chemistry of Natural Waters," he has shown that argillaceous sediments deprive waters of the organic matter in solution by forming a compound containing an organic radical. He says, "There is reason to believe that alumina is under certain conditions dissolved by waters holding organic acids," and cites melite and pigotite as examples of the compounds formed. He further shows that organic matter in water reduces sulphates to sulphides, producing from soluble sulphates of lime and magnesia carbonates of the basis, with hydrogen sulphide, free sulphur, or a metallic sulphide; the hydrogen sulphide being converted by slow oxidation or combustion, followed by absorption of oxygen directly into sulphuric acid, which is again, when in contact with organic matter, reduced to hydrogen sulphide.

He says with reference to the water of palæozoic brine springs, "In the large amount of magnesium chloride which they contain, these waters resemble the bittern or mother-liquor which remains after the greater part of the sodium chloride has been removed from sea-water by evaporation. . . . . The complete absence of sulphates from many of the waters points to the separation of large quantities of earthy sulphates in the Cambrian strata from which these saline springs issue; and the presence in many of the dolomite beds of the Calciferous sand rock of small masses of gypsum, abundantly disseminated, is an evidence of the elimination of sulphates by evaporation. . . . . The brines of the valley of the Allegheny river, obtained from borings in the coal formation, are remarkable for containing large proportions of chlorides of calcium and magnesium, though the sum of these, according to the examples given by Lenny, is never equal to more than about one-fourth of the chloride of sodium. The presence of the sulphates of barium and strontium in these brines, and the consequent absence of soluble sulphates, is, according to Lenny, a constant characteristic in this region over an area of 2000 square miles."[1]

Among many other illustrations that might be given of these non-sulphated palæozoic waters, I mention one which was obtained from a boring on Great Manitoulin island in Lake Huron, at a depth of 192 feet, "After passing through the black slates of the Utica formation, and for sixty feet into the underlying Trenton limestone. . . . . It contained no sulphates nor barium nor strontium." Another palæozoic water of a very different character was obtained from a well bored for petroleum at Bothwell, Ontario, in 1865. "At a depth of 475 feet from the surface, and probably at or near the base of the Corniferous limestone, a copious spring was met with of very sulphurous water and a little petroleum." The water contained sulphate of calcium and sulphides of sodium and hydrogen. Waters apparently similar are pumped from several of the oil wells in the vicinity. "The sulphurous impregnation is doubtless to be ascribed to the reducing action of hydrocarbonaceous matter upon the sulphates which the waters contain."[2]

9. A brief examination of the superposition of the palæozoic and earlier formations of North America will show the Laurentian, embracing the oldest known rocks of the globe, outcropping from the coasts of Labrador to Lake Superior and over a large area in northern New York. Associated with this system is the Norian, which is characterized by a great development of opalescent feldspars. Above these are the Green Mountain series, an inferior part of the Lower Silurian, which corresponds wholly or in part to the Huronian system of Canada and the region about Lake Superior. Above them are the White Mountain series, which are Upper Silurian and perhaps Devonian. These formations constitute for the most

---

[1] Bischof, *Chem. and Phys. Geol.*, i, 337. Hunt, *Chem. and Geol. Essays*, p. 121, ed. 1875. *Am. Jour. Sci.*, March, July and Sept., 1865.

[2] *Essays*, 158–163, ed. 1875.

part the rocks of Canada, New England, eastern New York and the eastern slope of the Alleghenies southward through New Jersey, Pennsylvania and Virginia. Speaking of these rocks, Dr. Hunt says, "In the oldest known of them, the Laurentian system, great limestone formations are interstratified with gneisses, quartzites and even with conglomerates. All analogy, moreover, leads us to conclude that, even at this early period, life existed at the surface of the planet. Great accumulations of iron oxide, beds of metallic sulphides and of graphite, exist in these oldest strata, and we know of no other agency than that of organic matter capable of generating these products.[1] . . . . Bischof had already arrived at the conclusion, which in the present state of our knowledge seems inevitable, 'that all the carbon yet known to occur in a free state can only be regarded as a product of the decomposition of carbonic acid, and as derived from the vegetable kingdom.' He further adds, 'living plants, decomposed carbonic acid, dead organic matters, decomposed sulphates, so that, like carbon, sulphur, appears to owe its existence in the free state to the organic kingdom.' As a decomposition (deoxidation) of sulphates is necessary to the production of metallic sulphides, the presence of the latter, not less than of free sulphur and free carbon, depends on organic bodies; the part which they play in reducing and rendering soluble the peroxide of iron, and in the production of iron ores, is, moreover, well known."[2]

Rocks of the Lower Cambrian in Great Britain as well as in North America are well known to exhibit carbonaceous remains. Of the former it is said, "They occasionally hold flakes of anthracite, and small portions of mineral pitch exude from them in some localities." The rocks of the Malvern hills contain fucoids. In the Quebec series on the south shore of the St. Lawrence, Hunt describes the occurrence of a carbonaceous substance, "entirely distinct from coal, which occurs in fissures, sometimes in the interstices of crystalline quartz. It is an insoluble hydrocarbonaceous body, brilliant, very fragile, giving a black powder, and results apparently from the alteration of a once liquid bitumen."[3] Similar material often lines cavities in the limestone in Herkimer county, New York, and not only sometimes encloses crystals of quartz, but is often enclosed in quartz crystals. These limestones are not crystalline.

---

[1] On the north shore of Lake Superior, I have found spherical concretions of graphite occuring in a rock that is apparently eruptive.

[2] *Essays*, pp. 301, 302. *Am. Jour. Sci.*, 1871.

[3] *Essays*, pp. 382, 396. W. Hodgson Ellis, "Analysis of Some Precarboniferous Coals," *Chem. News*, lxxvi, 186, Oct. 15, 1897.

Above these formations just mentioned, in the Carboniferous formation of both Europe and North America, anthracite occurs in metamorphosed strata. In Wales, Belgium, the Alps and France, such phenomena are frequent. The coal deposits of Massachusetts and Rhode Island are enclosed in highly metamorphosed strata. Much of the material is more nearly graphite than coal. Both the coal and the enclosing strata are so distorted that the bedding is destroyed and the material appears in segregated masses.

In the trap dykes that have penetrated the sedimentary formations of the Connecticut valley and New Jersey, veins of carbonaceous matter occur. These dykes are intruded masses, no doubt formed by the igneo-aqueous fusion of sediments that contained organic remains.[1]

10. With the exception of the exudation of mineral pitch mentioned above, I have seen no notice that bitumen occurs in crystalline rocks, but always in rocks adjacent to or above them. There are vast areas of the palæozoic formations of North America that are not crystalline, that have been more or less subjected to the action of steam and pressure at temperatures that have made them more or less the subjects of metamorphic action. Some of these rocks contain bitumen and others do not. The limestones in the bluffs of the Mississippi river at Minneapolis and St. Paul contain in the cavities of their fossils crystals of pyrite and rhomb spar. They immediately overlie the St. Peter sandstone and are said to belong to the Trenton group. Similar limestones in southern Michigan contain bitumen, free sulphur and sulphates in large amount. In southern Kentucky and Tennessee the limestones are often coarsely crystalline and contain large encrinite stems that are silicified. These same rocks contain geodes lined with crystals of quartz. Other geodes contain sulphates of barium, strontium and calcium, both with and without bitumen. In other localities the rocks of this age are filled with bitumen widely disseminated in small quantities. These rocks often exhibit very slight evidence of the effects of heat, but frequently are found immediately above or upon crystalline schists.[2]

---

[1] L. C. Beck, *Am. Jour. Sci.* (1), xlv, 335. I. C. Russell, *ibid.* (3), xvi, 112.

[2] S. F. Peckham, *Reports of the Tenth Census of the United States*, Vol. x, "Petroleum," p. 63.

11. In Prof. James Hall's celebrated Introduction to *The Palæontology of New York,* he shows that the earliest palæozoic sediments were deposited in a current that moved from southeast to northwest. Later the current moved diagonally across them from northeast to southwest. These later currents represent a vast interval of time, during which material accumulated to a depth of tens of thousands of feet of coarse sediments to the northeast in Canada, and growing finer diminished to the southwest in the Mississippi valley to a few thousands of feet. If metamorphic action is due to the accumulation of sediments, whereby the isothermal lines of the earth's crust rise to meet the increased pressure, by consequence of which sediments are brought into a state of igneo-aqueous fusion, it is not difficult to explain why, at a period in the earth's history, when the condition of the earth's crust, the ocean and the atmosphere, all contributed to maintain a high temperature, the strata as we pass from the southwest in the Mississippi valley towards the northeast should present, at the surface, increasingly the effects of heat.[1]

12. Let us now turn to Technology and see what the experience of more than half a century can teach us in relation to this question of the origin of Bitumen. Soon after 1830, Reichenbach in Germany,[2] Sèlligue in France and Gregory in Scotland, all worked upon the destructive distillation of pyroschists, wood, coal, peat and petroleum. They all discovered paraffine, and what is suggestive, they all propounded the idea that bitumens are distillates. They established the fact that pyroschists, wood, coal, etc., when destructively distilled yield paraffine and the oils found in petroleum. Sèlligue established quite a valuable industry in France, using as his raw material the schists of Autun. About 1850, the Scotch paraffine-oil industry arose. The raw material was a shale, called Boghead mineral, that was well known to contain fossil fishes. The distillate of this mineral closely resembled petroleum, and when petroleum was discovered in the United States in commercial quantities, the refineries on the Atlantic coast, that had been importing the Boghead mineral, commenced to work petroleum with slight changes in their processes. At the same time, the

---

[1] *Nat. Hist. of N. Y.,* "Palæontology," iii, 45–60.

[2] *Jour. für Chem. u. Phys.,* von Schweiger-Seidel, 1830, lix, 436. *Trans. Roy. Soc. of Edinb.,* xiii, 124. *Rep. of Pat. Inven.,* n. s., iv, 109. *Jour. des Connaisances Usuelle,* Dec., 1834, p. 285. Dingler, lvi, 40.

Albertite of New Brunswick was also being distilled on the Atlantic coast, while west of the Alleghenies cannel coal was being distilled at Cannelton, on the Kanawha river, in West Virginia; at Cloverport, on the Ohio river, in Kentucky; at Newark, O., and near Pittsburgh, Pa. The experiment of distilling oil from Devonian pyroschists was also made at Erie, Pa. They yielded fifty gallons of distillate to the ton. Without exception every one of these materials yielded paraffine, and when the petroleum obtained from Pennsylvania and West Virginia was used as a substitute, it was found that it yielded identical products, and the coal-oil industry was quickly rendered unprofitable. In an attempt to utilize all available material, William Atwood, who was one of the most skillful technologists in coal oil, was sent to the Island of Trinidad, where a plant was constructed and an unsuccessful attempt made to prepare illuminating and lubricating oils from Trinidad pitch. The pitch furnished distillates very different from the paraffine products obtained in the United States.

During the last years, before the coal-oil industry ceased to be profitable, a number of patents were granted for improvements in this technology, mainly for improved methods of distillation. The aim of these inventions was to effect a uniform heating of the material by which a slow distillation at low temperatures would be promoted. The presence of steam, often superheated, was found to be at all times beneficial. While to produce gas from these materials, it was found necessary to thrust them into a retort heated to a high temperature; to produce oil, it was found on the contrary best to distill at the lowest temperature possible. The intermediate oils, too dense for illumination and too light for lubrication, accumulated in the refineries, until Joshua Merrill discovered that by distilling them in such a manner that the vapors were superheated the vapors were "cracked" or "dissociated," and when they were condensed they were found to be of such a specific gravity that they could be used for illumination. This was the most important discovery ever made in the technology of bitumens, and when applied to the manufacture of paraffine petroleums it was of enormous value.

Soon after 1860, attempts were made to treat the bitumens of southern California by the same methods of distillation that were employed in treating paraffine oils, but all the results obtained showed that the processes were being applied to different materials and the results were different. These results all pointed to an excess of carbon and more unstable compounds. On analysis these crude oils were found to contain a large percentage of nitrogen as compared with paraffine petroleums.[1]

Canadian petroleum had been known to contain sulphur and to be difficult to refine. When similar oils were obtained in large quantities about 1885, in western Ohio, the sulphur petroleums became a serious problem in the technology of bitumen, as it was commercially desirable to treat them in the same manner as the pure paraffine petroleums of Pennsylvania. During 1893 and 1894, the technology of California bitumens was again investigated. Destructive distillation when applied to these bitumens, resulted in the production of a large volume of gas and asphaltic residuums with a distillate consisting principally of unsaturated hydrocarbons. The crude oils were found to be allied to the crude oils produced in the Scotch shale-oil industry, as they contain a large percentage of nitrogenous basic oils.[2]

There were thus established among North American bitumens three great classes: those known as "Pennsylvania oils," consisting of nearly pure paraffines, for which I have elsewhere proposed the name of Warrenite; those known as "Lima oil," which together with the Canadian oils contain a notable proportion of sulphur compounds, for which I have proposed the name of Maberyite, and the California oils, which occur in great variety and, while containing sulphur, are characterized as nitrogen bitumens and for which I have proposed the name of Venturäite. There is also a class of bitumens not yet investigated that are found on the eastern slope of the Rocky mountains from Mexico to the Arctic circle. In Europe, the paraffine petroleums of Galicia appear to be quite distinct from the bitumens of the Caspian sea. Technology has also divided bitumens into two great classes that are largely determined by geological occurrence. The great petroleum region of North America, which is by far the most important in the world, lies in the great palæozoic basin that surrounds the Cincinnati anticlinal; while the bitumens of California, the West Indies and Europe issue from Tertiary rocks. These Tertiary bitumens are found in much greater variety and are uniformly more difficult to refine into commercial articles than the bitumens obtained from older formations.[1]

---

[1] S. F. Peckham, *Reports Geol. Surv., California,* "Geology," ii, Appendix, p. 73.

[2] S. F. Peckham, *Am. Jour. Sci.* (3), xlviii, 250.

It is proper to mention in this connection three classes of investigations that have been made on a commercial scale. The first was made about 1860–65, by Cyrus M. Warren, and consisted in distilling destructively the lime soap made from menhaden (fish) oil. The products of this distillation were refined into illuminating oil, in all respects identical with coal oil and refined petroleum; and they were also proved by an elaborate research to contain the same constituent hydrocarbons. Quite recently, Prof. Karl Engler, has repeated these experiments with the addition of pressure and steam during distillation. Warren's results were confirmed. Still more recently, Dr. S. P. Sadtler has discovered that the vapors escaping from linseed oil while being boiled furnish, when condensed, a petroleum-like liquid, which upon examination was found to consist of hydrocarbons identical with those found in Pennsylvania petroleum. It is an honor to American science that these results, valuable and interesting alike to science and technology, were obtained by American investigators.[2]

The general conclusion from technology appears to be, that for commercial purposes, crude bitumens and the products of their distillation may be duplicated by products of the destructive distillation of pyroschists, wood, coal, peat and a great variety of animal and vegetable substances.

13. It would be entirely unnecessary for my present purpose to notice in detail all the researches that have been undertaken upon bitumen, in all its various forms, since de Saussure published his paper on the *Naphtha of Amiaño*, in 1817. It is sufficient to indicate along what lines the investigations have proceeded and in what manner the results have been interpreted. The earliest investiga-

---

[1] Boverton Redwood, *Petroleum*, etc., London, Charles Griffin & Co., 1896, ii. S. F. Peckham, PROC. AM. PHIL. SOC., x, 445. *Repts. 10th Census, U.S.*, x. "Petroleum," *Am. Jour. Sci.* (3), xlviii, 250 and 389, l, 33. *Science* xxiii, 74. *Jour Frank. Institute*, Nov., 1895. S. P. Sadtler, *Am. Jour. Pharm.*, Sept., 1896. C. F. Mabery, *Jour. Frank. Institute*, cxxxix, 401. *Proc. Am. Acad.*, n. s., xxiii. *Am. Chem. Jour.*, xix, 243, 374, 419, 796. B. Silliman, Jr., *Am. Jour. Sci.* (ii), (xliii,) 242. *Chem. News*, xvii, 257. *Bul. Soc. Chem. de Paris*, 1868, p. 77.

[2] C. M. Warren and F. H. Storer, *Mem. Am. Acad.*, n. s., ix, 177. Karl Engler, *Berichte der Deut. Chem. Gesellschaft*, 1888, xxi, 1816, xxii, 592. Dingler, *Poly. Jour.*, 1889, p. 271. S. P. Sadtler, *Am. Jour. Phar.*, Sept., 1896.

tors analyzed bitumens as if they were homogeneous substances. They determined the carbon and hydrogen, added the percentages together and subtracted the sum from one hundred, calling the deficit oxygen. This went on for nearly fifty years. It is true that Prof. B. Silliman, Jr., fractionated petroleum by distillation, and queried whether the liquids that he obtained were educts or products. It was not until 1863 that Schorlemmer, in England, and Pèlouze and Cahours, in France, published researches that professedly separated the compounds that were mixed together in petroleum. They were soon followed by Warren and Storer in the United States, who, by a superior method of condensation, succeeded in separating the hydrocarbons in coal-tar naphtha, naphtha from Pennsylvania and Rangoon petroleum, naphtha from lime soap of menhaden oil and also the hydrocarbons from oil of cumin. These researches established the existence in these liquids of several series of hydrocarbons, the members of which were identical, whether obtained from natural or artificial substances, and were also in many cases recognized as identical with chemical compounds already well known.[1]

Since these results were published, a great amount of work has been done with varying success upon a great variety of petroleums, in which work progress has been observed along two lines, viz., first, better methods of separation, and second, better methods of ultimate analysis. It is only quite lately, however, that Prof. C. F. Mabery has succeeded, by distilling *in vacuo* with Warren's hot condenser, in so completely avoiding decomposition by cracking as to reach results that are final. While this is said without any wish to disparage the work of other investigators, it must be said with a proper regard for truth.[2] There is, however, a vast amount of chemical research on record, a very complete *résumé* of which can be found in the exhaustive work of Mr. Boverton Redwood, which has given results sufficiently accurate for my purpose. These results may be generalized as follows :

---

[1] Theo. de Saussure, *Ann. Chim. et de Phys.* (2), iv, 314–320. *London Jour. of Sci.*, iii, 411. B. Silliman, Jr., *Am. Chemist*, ii, 18. *Moniteur Scientifique*, No. 366. *Am. Jour. of Gas Lighting*, xvi, 83. Wagner's *Ber.*, 1872, p. 848. C. Shorlemmer, *Chem. News*, 1863, viii, 157; xi, 255. *Am. Jour. Sci.* (2), xxxvi, 115. *Rep. de Chim. Appliqueé*, 1863, p. 174. *Jour. für Phar.*, xxi, 320. J. Pelouze and Aug. Cahours, *Comptes Rendus*, lvi, 505; lvii, 62. *Ann. de Chim. et de Phys.* (4), i, 5. *Am. Jour. Sci.* (2), xxxvi, 412. C. M. Warren and F. H. Storer, *Mem. Am. Acad.*, n. s., ix, 121–176. *Am. Jour. Sci.* (2), xxxix, xl and xli. *Chem. News*, xii, 85, 261, *et seq.*

[2] C. F. Mabery, *Proc. Amer. Acad.*, n. s., xxiv; *Amer. Chem. Jour.* xix, 243, 374, 419.

The Pennsylvania petroleums are the purest paraffine petroleums known. They contain small percentages of olefines and traces of benzoles. The same hydrocarbons have been found in other petroleums, in the distillates from cannel coal, pyroschists, peat, wood tar, fish-oil soap, fish oil under pressure and linseed oil, and also from grahamite, albertite, ozocerite and many other substances of mineral and organic origin.[1]

The Lima and Canadian petroleums contain the paraffine series, with a notable proportion of sulphur derivatives of the paraffines, formed by substitution ; and also traces of benzoles and nitrogenous basic oils.[2]

The Russian oils contain the benzole hydrides and naphthenes.[3]

The California oils, so far as at present known, consist of the benzole hydrides, naphthenes, benzoles and sulphur substitution compounds with a large percentage of esters of nitrogenous basic oils.[4]

The Scotch shale oils contain paraffines, olefines, benzoles and esters of nitrogenous basic oils.[5]

These esters are also found in coal tar and in Dippel's oil, the latter being an oil obtained as a distillate from the gelatine of bones.

No satisfactory research has ever been undertaken upon semifluid malthas or solid asphaltums. They cannot be distilled without decomposition, and no analysis by solution has yet been made that was not highly empirical. It is assumed, rather than proved, that many solid bitumens contain oxygen. They certainly do contain sulphur, and in some instances they contain nitrogen. When distilled upon the large scale solid bitumens are decomposed and nothing but decomposition products are found in the distillate, while coke remains in the still. These decomposition products are very varied. Those that are geologically old yield paraffine, while those that are recent do not.[1]

---

[1] Schorlemmer, Pelouze et Cabours, Warren and Storer, Mabery, *loc. cit.*

[2] Mabery and Smith, *Proc. Amer. Acad.*, n. s., xxiii; *Amer. Chem. Jour.*, xvi, 83, 89, 544; xvii, 713; xix, 419.

[3] Beilstein and Kurbatow, *Ber. d. D. Chem. Ges.*, 1880, p. 1818. *Jour. Amer. Chem. Soc.*, xiii, 232. Markonikow and Oglobini, *Ber. d. D. Chem. Ges.*, xviii, 2234; *Ann. de Chim. et de Phys.* (6), ii, 372.

[4] S. F. Peckham, PROC. AMER. PHIL. SOC., x, 445; xxxvi, 154; *Amer. Jour. Sci.* (3) xlviii, 250. C. F. Mabery, *Jour. Frank. Inst.*, cxxxix, 401. Boverton Redwood, *Petroleum*, i, 203.

[5] English patents.

Prof. Mabery has remarked that all petroleums contain the same proximate principles in different proportion. While this statement may be absolutely true, it is not so relatively. The palæozoic bitumens have been most carefully studied and they consist mainly of paraffines. The Tertiary bitumens have been less carefully studied, and they consist principally of benzoles and their derivatives in great variety. Mingled with these are the olefines and other series of hydrocarbons in small proportion, with an immense number of oxygen, sulphur and nitrogen derivatives and substitution compounds, the existence of which has been only recently suspected.

It can, therefore, be asserted that the natural bitumens and the substances resembling them that are obtained by the destructive distillation of mineral and organic substances, are strikingly similar. The palæozoic bitumens bear a resemblance to the simple distillates produced in the presence of steam, at low temperatures, when nitrogen is practically absent. The Tertiary bitumens resemble the distillates obtained at higher temperatures and when the raw material is rich in animal remains. There are, however, a large number of bitumens that have been too little investigated to admit of any generalizations concerning them. In illustration of this statement I would call attention to the valuable papers of Prof. Henry Wurtz, in which he shows that many so-called native paraffines are probably olefines.[2] I would suggest that some of them may be the higher naphtenes, that have the same percentage composition as olefines. The solution of these problems awaits a vast amount of research.

14. In the preceding pages I have given an outline of the views generally held by chemical and physical geologists concerning the chemical phenomena attending the cooling of the earth and its shrinking and contracting crust. To these I have added a *résumé* of the technical and chemical knowlege we possess concerning bitumens. I shall now proceed to discuss, in the light of these facts,

---

[1] S. F. Peckham and L. A. Linton, *Amer. Jour. Sci.* (4), i, 193. S. F. and H. E. Peckham, *Jour. Soc. Chem. Industry*, xvi, 424; H. Endemann, *ibid.* xv, 871; xvi, 121.

[2] H. Wurtz, *Eng. and Min. Jour.*, xlviii, 25, 114; li, 326, 376.

the occurrence of bitumens and the relation of such occurrence to their probable origin.

Leaving the problems of orography to the physical geologist for solution, there are a few suggestions to be made relating to these problems that I have not seen anywhere mentioned. If we regard the dizzy heights of the Andes and Himalayas, or the profound abysmal depths of the Pacific as isolated phenomena, they appear on a scale of oppressive grandeur and immensity; yet these irregularities in the earth's crust reach a maximum of only about ten miles in vertical height, which is only one twenty-five hundredth or four hundredths per cent. of the circumference of the earth at the equator. The local foldings of a few hundreds of feet in disturbed strata are microscopic when compared with the earth's diameter; and yet we are accustomed to regard these plications of strata as the result of sudden movements in the earth's crust. This is a pure assumption. The period of time through which critical observations of geological phenomena have been made when compared with the time that has elapsed since life dawned upon the earth is also microscopic; it is a smaller fraction than four hundredths per cent. The element of time in geological phenomena is only just beginning to be appreciated. We have learned from a few years of observation that some continental masses are rising and others falling with reference to the sea level; yet no one has observed these movements through many centuries, nor have these vertical movements of the coasts of the world been corelated and the laws that govern such movements been determined. We do not know whether a continent has emerged from an ocean maintaining a constant level, or whether the ocean has receded as the contracting mass has rendered the ocean depths more profound, or, as is more probable, the shrinking of the crust has changed the distance of the ocean surface from the centre of the earth, rendering the elevations apparently greater. It is not material to this question that we should know. Nor is it of importance to consider whether the continued operation of forces at present active through countless centuries, or the repeated interjection of cataclysms of world disaster, has brought the earth to its present condition. Volcanic eruptions, earthquakes and floods, separately and unitedly, change the face of nature within our own generation; it is reasonable to suppose that they have acted from the earliest period of the earth's history to the present time with constantly lessening violence. It is true that the local effects of such phenomena as the earthquakes at Lisbon and Java and the Red River fault appear cataclysmic; yet these effects are microscopic when compared with the dimensions of the earth, and may have been, nay, probably were the culmination of a series of movements that had been in progress for immense intervals of time. I therefore believe that in stating the causes of those changes that have taken place at the surface of the earth as we now know it, one of the most important considerations is the unlimited periods of time through which the pressure due to accumulation of sediments and the consequent development of heat has acted upon those sediments, which in many instances were filled with water charged with mineral matter in solution. From the combined action of pressure, heat and steam, through unlimited periods of time, the constituent elements of sediments have been brought into every possible state of combination, from obsidian and pumice, which have been completely fused, through lavas, granites, gneisses, etc., to sediments in which there has been no change at all. As Dr. Hunt has fully shown, the action of thermal waters, which have been largely instrumental in producing these changes, has been often extremely localized both laterally and vertically, and may be greatly varied by the constituents of the sediments themselves.

15. If, then, we accept the hypothesis that all of the rocks as we now know them are sediments, whatever may be their present condition, we are forced to the conclusion that life first appeared upon the planet at a date too remote to be determined even in geologic time, and that the remains of organic forms have practically been a constant constituent of sediments from that time to the present. As might be expected, we find organic remains in every possible condition, from crystallized graphite to unaltered cellulose. Vegetable and animal remains are found in every conceivable condition of replacement and alteration. We find pseudomorphism in the strictest sense as well as metamorphic action developed in every possible degree. Nor can we assert that any of the older strata are free from such action, for metamorphism is, as the word signifies, a change of form, and no limits can be assigned to such change in either time, place or degree that are not arbitrary. There can be no question that as sediments have accumulated slowly so these changes have progressed slowly.

Nevertheless, following upon long periods of quiet, there appear to have been periods of cataclysmic violence, as when the vast lava sheets that form the table mountain of the Sierra Nevada were poured out, not from a single peak, but from a whole range of peaks; when the whole of southern Colorado and northern New Mexico and Arizona were covered with lava sheets thousands of square miles in extent; or when the valleys of West Virginia were upheaved, the Oil Break formed and the mass of plastic grahamite forced into the fracture; or when the basic rocks that form the mounds of iron porphyry in Cumberland and Foster, R. I., were thrust up from the deeps; and the trap dykes along the whole eastern borders of the Alleghanies were poured into fractures of local extent. But these convulsions that have brought basic porphyrys, basalts, trap dykes and local metamorphism to the surface, have in the physical and chemical operations of nature produced anthracites and anthracitic residues and not bitumens. Bitumens are not the product of the violence of volcanic or cataclysmic action, but of the gentler action of normal metamorphism exerted through long periods, during which the volatile bitumen has been distilled from sediments containing organic matter, and at the lowest possible temperature, without regard to time, as the sediments were pressed down to an isothermal that admitted first of their distillation and then of the conversion of the carbon residues into graphite.

16. Dr. Hunt has left hundreds of pages in which he has shown that the crystalline and eruptive rocks, as we know them, are altered sediments. His argument is conclusive that the carbon that they contain is derived from organic forms. When discussing bitumens he shows, first, that the pyroschists do not, except in rare instances, contain bitumen, and are not in the proper sense of the word bituminous. Secondly, he shows that the pyroschists do not, "whether exposed at the surface or brought up by boring from depths of many hundred feet, present any evidence of having been submitted to the temperature required for the generation of volatile hydrocarbons." Thirdly, he shows that as the oil occurs in the limestone it could not have been distilled. He further shows that the Utica slate that is beneath the lower Devonian limestones is unaltered, and adds, "More than this, the Trenton limestone, which on Lake Huron and elsewhere has yielded considerable quantities of petroleum, has no pyroschists beneath it, but on Lake Huron rests on ancient crystalline rock with the intervention only of a sandstone devoid of organic or carbonaceous matter.[1]

---

[1] T. S. Hunt, *Essays*, p. 169, ed. 1875.

I have already shown (§ 6) that sediments become crystalline at very low temperatures and that the crytalline schists below the lowest stratified rocks contain abundant evidences of organic forms. Are we to suppose that there was no intermediate zone in which normal metamorphism died out and faded into unaltered sediments? We ought to expect to find the pyroschists in their normal condition. We ought to expect to find the coal altered or unaltered, according to its proximity to the heated area. We should not expect to find the carbonized remains of organic forms in rocks containing bitumen; for we cannot suppose that those beds that yielded the bitumen by distillation were suddenly plunged into a condition of igneo-aqueous fusion by which the organic constituents were instantly converted into anthracite and gas. As a general rule the process of conversion must have been as gradual as the progress of deposition. We cannot assume that in every instance the anthracite is the residue from a distillation of which the distillate was completely lost. Moreover, the example cited in § 7 is a complete demonstration, occurring as it does in a region rich in bitumen, that the change from sediments to crystalline schists is progressive and involves the organic as well as mineral constituents of the strata.

17. If a traveler should leave Boston, Mass., and travel in a generally southwest direction toward San Diego, in southern California, he would encounter along his route a series of object lessons that would lead to but one conclusion. Whatever the age of the crystalline rocks of New England may be, they are certainly for the most part older than the Carboniferous. The small basin around Mansfield, Mass., extending into Rhode Island, which contains the anthracites of that region, is surrounded by crystalline rocks, and, indeed, the anthracite beds themselves are, as already stated, altered to a substance nearer graphite than coal. The coal slates contain only impressions of coal plants, and fossils of any description are extremely rare in the vicinity. Intrusions of trap are frequent, and cones of highly basic porphyrys are thrust up through all of the crystalline sediments at several points. The change of form has been very complete in respect to every constituent of the sediments.

Westward around New Haven, Conn., the bedding of the sediments has not been so completely obliterated, but the change in the organic constituents has been quite as general. In the gneissoid traps of that region, thin veins occur of anthracitic material, which alone remains to represent the organic constituents of the altered sediments. Continuing our course southwestward the same changed condition is observed in the crystalline schists of Manhattan Island, and across the Hudson through northern New Jersey. Intrusions of trap, too, are frequent through all this region and the sole representative of the organic constituents of the sediments is anthracitic residues.

On the western slope of the Catskills, through eastern New York, the crystalline rocks which exist at varying depths below the surface are overlaid with sediments which are frequently imperfectly metamorphosed, and as one moves westward into central New York and northeastern Pennsylvania, while the coal beneath the surface is anthracite and the residues before mentioned that fill cavities in the limestone are anthracitic, still the surface rocks show less and less signs of alteration. As the summit of the Alleghanies is reached and passed, the coal beds fade by insensible stages from anthracite into unaltered splint and cannel coals. The beds of slate also become beds of pyroschists, and the formations generally assume the aspect of unaltered sediments. On the western slope of the Alleghanies the surface descends much less abruptly than it ascends on the eastern slope. The dip of the formations is much greater than that of the surface, consequently the outcropping edges of newer formations are repeatedly encountered, until in western Pennsylvania and New York metamorphism has ceased to be a problem in surface geology. These surface rocks are, however, geologically all below the coal, which in eastern Pennsylvania is metamorphosed into anthracite. There is no arbitrary line that separates the unaltered from the altered strata. The successive formations have thinned out, and in general they continue to become thinner as we go southwest; but there is no anthracite between the crest of the Alleghanies and the mountains of Arkansas. Throughout the Mississippi valley, as we pass to the west, these formations outcrop and overlie each other precisely like the shingles on a roof, with the pitch reversed.

In the Bradford oil field, in McKean county, Pa., the drill penetrates a bed of porous sandstone that lies enclosed in impervious unaltered strata. It contains a few shells and fish bones, but no other fossils. Like the surface rocks it lies sloping toward the southwest, the lower portion submerged in salt water, the middle portion filled with petroleum and the upper portion filled with gas; both originally under an enormous pressure. In Warren county, farther to the southwest, the drill reaches petroleum not in the McKean county sand, but in a different sand, higher in the series. Still farther southwest, in Venango county, the surface rocks are still higher in the series and the drill reaches petroleum in a pebble conglomerate that outcrops at the surface to the northeast. These pebble conglomerates, known as the "Venango Oil Sands," formed great riffles in the currents of the primeval ocean. They are several miles long and a few rods wide, level on the upper surface, and rounded on the under surface to a feather edge at the sides. One is above the other and they are covered, when they contain petroleum, with a solid, impervious shell of silica, that the drill penetrates with difficulty. The uppermost of these conglomerates consists of spherical pebbles of yellow quartz, about as large as cranberries; the lowest consists of lenticular pebbles of very white quartz. In both cases the pebbles are cemented together at their points of contact leaving large open spaces. These conglomerates are sometimes replaced by coarse, porous sandstones; neither of these contain fossils of any kind. Still farther southwest, on Slippery Rock creek in Mercer county, and at Smith's Ferry in Beaver county, another sandstone, that is barren where it occurs in Venango county, yields petroleum above the pebble conglomerate. If a line be followed farther to the left, across western Pennsylvania and into West Virginia, the outcrops of the formations would rise successively in the scale until the oil would be found in the Mahoning sandstone, which lies at the top of the Lower Productive Coal Measures. Since the development of the Lima oil fields the range of rocks holding the petroleum reaches in Ohio, Canada and Pennsylvania from the Lower Silurian, Trenton limestone, to the Lower Coal Measures. These rocks embrace nearly the entire palæozoic formations of North America. Very few wells have been sunk below the petroleum-bearing sandstone, for the obvious reason that it involved a useless expense. One of the deepest wells ever drilled in the oil region of western Pennsylvania was Jonathan Watson's deep well near Titusville. This well went down through all of the oil sands and the Devonian shales beneath them, to a depth of 3553 feet, when just as it was abandoned a hard rock was struck which was supposed to be the Corniferous limestone, which is the oil-bearing rock of Canada. The interval between the oil sands and the bottom of the well was filled with Devonian shales, that underlie the Bradford oil sand and are supposed to extend from Allegheny county, New York, to central Kentucky; and in fact to underlie the entire petroleum region that produces Warranite—the pure paraffine petroleums. When "dry" or unproductive holes are drilled outside the productive areas, they pass, at the horizon of the oil sands, through a different rock, which is compact and incapable of holding petroleum. These underlying Devonian shales outcrop at Erie, Pa., and furnish there the material that on distillation yielded fifty gallons of distillate to the ton. Where this formation outcrops it is filled with fucoids and has yielded small petroleum and gas wells. The men who drilled Jonathan Watson's deep well told me that, "the soap stone (Devonian shale) became harder as they went down, and was redder in color, in fact, had been burnt like brick." In a comparatively few localities, petroleum has been found saturating rocks that lie one above the other. The upper rock invariably yields the most dense oil. In 1881 I saw a well in West Virginia, from which the same walking beam pumped at every stroke oil of 27 degrees from a depth of 255 feet and oil of 45 degrees from a depth of 600 to 700 feet.

18. I have never seen a specimen of graphite reported to have come from any locality between the crest of the Alleghanies and the Ozark uplift. This is an uplift of the palæozoic formation west of the Mississippi river, extending from central Missouri to central Texas. It resembles that of the Alleghanies, but is on a smaller scale.[1] The eastern slope is more abrupt than the western. The formations of the central portions, in Arkansas and the Indian Territory, are highly crystalline, graphite and anthracite are of frequent occurrence and are found on the western slope. On this slope also, but farther west, in unaltered strata immediately above the crystalline formations, bitumen occurs in enormous quantity and great variety. Over a large area in the northeastern portion of the Indian Territory heavy petroleums are found only a short distance beneath the surface, and, as I am informed, below the coal. South of the Red river, in northern Texas, bitumens occur saturating horizontal beds of sand that are intercalated between strata of more or less solid limestone. North of the Red river, in the Indian Territory, every rock formation that is at all porous appears to be

---

[1] J. C. Branner, "Former Extension of the Appalachians across Mississippi, Louisiana and Texas," *Am. Jour. Sci.* (4) iv, 357.

filled with bitumen. As far as I have investigated it, the bitumen is uniform in kind and quality. It has saturated beds of sand, strata of sandstone and limestone, some of which are hard and crystalline, others magnesian and almost as soft as chalk, some of them without fossils and some almost all fossils, and all of them conformable with the Upper Silurian and Lower Carboniferous rocks that enclose them. In one locality a sort of bituminous breccia occurs, of immense extent, consisting of fragments of limestone and quartzite cemented together with bitumen. In another an immense horizontal bed of sand, completely saturated with bitumen, is overlaid with thirty or forty feet of conglomerate that has been more or less penetrated with it.

Almost all the beds north of the river are in very sharp folds, that bring the strata to the surface nearly vertical, in eroded anticlinals that extend across the country in parallel lines, often many miles in length. What is of especial interest in this connection is the occurrence in the vertical limestones and sandstones of imperfectly saturated strata. The bedding varies from the thickness of paper to a few inches. The rock mass was usually most easily penetrated along the lines of the thinnest beds. Fractures which cross all these beds, including both the thin and thick ones, show the bitumen completely filling the thin beds and only partially penetrating the seams and the mass of the thicker cryptocrystalline strata. Nothing could more beautifully and clearly demonstrate the fact that the bitumen was not indigenous to these rocks, but had penetrated them while previously and as at present in their nearly vertical position.

19. Continuing our journey across the continent, bitumen is frequently encountered in positions contiguous to normal or local metamorphism, until we descend into the great valley of California, west of the Sierra Nevadas. Here the development of bitumen has proceeded on a scale of vast magnitude. On the western slope of the Sierras the region around Roseville, in Placer county, and the vicinity of the city of Stockton, are well known to be rich in natural gas.[1] There are localities on these slopes that have also furnished limited supplies of petroleum, but, as before stated, the bitumen deposits of California are principally found in the Coast Ranges, including the ocean area lying between the Santa Barbara

---

[1] W. L. Watts, *The Gas and Petroleum Formations of the Central Valley of California*, 1894.

islands and the main land. The richest deposits have been found in Ventura county, on the border line that separates the Cretaceous from the Lower Miocene. None of the bitumen is found in crystalline rocks; yet the evidences of both normal and local metamorphism, in strata not far distant from the bitumen-bearing rocks, are abundant. The late Eli W. Blake once visited the Santa Barbara islands and afterwards described to me the cascades of lava that had descended from the volcanic cones in the centre of the islands over precipices into the sea. Bitumen has exuded for more than a century from the unaltered strata, whose upturned edges form the bed of the ocean, between these islands and the main land. The Tertiary formations that constitute the bluffs of the coast east and west of Santa Barbara contain deposits of bitumen of enormous extent and exhibit evidences of metamorphic action still in progress. Almost every large bluff from Point Conception to San Diego contains a solfatera, the action of which leaves the Miocene shales, originally rich in organic matter, devoid of a trace of carbon.

The best petroleum wells of Ventura county lie in the cañons of the Sulphur mountain, one of the foothills of the Coast Ranges. Other wells are similarly located with reference to these ranges.[1] None of them have penetrated crystalline rocks; yet the core of the Coast Ranges only a few miles east of the wells of the Pacific Coast Oil Co., as Dr. Goodale and myself found, is granite. Fragments of crystalline rocks are washed out of many of the large cañons that head in the main Coast Range back of the foothills in which the oil wells are drilled. Deep drilling is extremely difficult in this region on account of the fragile character of the rocks. It might be impossible to carry a well down through all the bituminous strata to the crystalline rocks, but the fact that they are altered Miocene sediments and exist at a comparatively short distance below the surface does not admit of any question. The evidences of metamorphism, through the agency of hot, silicated water, are found everywhere. The formations contain abundant remains of highly organized animals; and the bitumens which they contain consist of benzoles and naphthenes, without an "appreciable amount of paraffines, if any."[2] They also contain sulphur and nitrogen. They are evidently the products of the distillation of highly organized animal tissue, as an effect of the accumulation of sediments, and of metamorphic action upon unaltered sediments, through granite and gneiss to lava and pumice.

---

[1] S. F. Peckham, *Mineral Resources of the United States*, "Petroleum in California," 1894.

[2] Letter of C. F. Mabery to S. F. P.

20. If we turn from North America to Europe-Asia, the testimony of the most eminent observers seems equally convincing. Daubrée was satisfied that the origin of the bitumen was found in metamorphism. Other French chemical geologists were equally well-grounded in this belief. As early as 1835, M. Rozet read a paper before the Société Geologique de France in which he discussed the occurrence of asphaltic limestone at Pyrimont. He says, "The bituminous matter is found equally in the calcareous rock and the molass that covers it. It is evident the action that introduced it into the two rocks is posterior to the deposition of the latter. The manner in which it is distributed in great masses, which throw their ramifications in all directions, joined in such a manner that the superior portions generally contain less bitumen than the remainder of the mass, indicate that the bitumen has been sublimed from the depths of the globe. . . . . It may be objected that such basaltic rocks do not appear in all the extent of the Jura. To that I reply that they are found in the neighborhood, in Burgundy and in the Vosges and further, that in the changes in the surface of the soil, whether occasioned by fractures or by the disengagement of vapors, the plutonic rocks do not necessarily appear at the surface. Perhaps in the deep valleys of the Jura the basalts are of very slight depth. . . . . In the Val de Travers, near Neufchatel, similar phenomena are observed."[1]

In 1846, Mr. S. W. Pratt associated the occurrence of bitumen at Bastennes with the eruption of ophite in the Pyrenees.[2] In 1854, M. Parran remarks concerning the occurrence of bitumen in the environs of Alais, "whatever be the origin of these substances, whether they be due to interior emanations from fissures of dislocation or to circumstances exterior and atmospheric, it is evident that there was during the Tertiary period an asphaltic epoch in relation to which it is convenient to recall the numerous eruptions of trachytes and basalts which characterize that period, and have probably acted by distillation upon masses of combustibles hidden in the bosom of the earth."[1] The anthracites of the Alps offer convincing proof that large amounts of organic matter have been involved in the metamorphic action that has prevailed in that region. In like manner the relation of the bituminous deposits of Galicia and Roumania to the crystalline rocks of those countries show the part that metamorphism has played in their occurrence.

---

[1] *Bull. Geol. Soc. de France* (1), vii, 138.

[2] *Quar. Jour. Geol. Soc.*, ii, 80.

21. No theory that refers the origin of the bitumen to any physical or chemical action that has prevailed on a cosmic scale can satisfactorily explain the differences that exist in crude bitumens. Mr. Phillips has added the testimony of chemistry itself to show the improbability of a chemical origin for bitumens on a cosmic scale. Dr. Day has shown the reasonableness of an hypothesis which regards the bitumens of Pennsylvania as distillates, but his idea that the variation in the petroleums of that region is due to the effect of filtration is, in my judgment, hardly tenable. In Pennsylvania the darkest and heaviest oils are nearest the surface. The sulphur content of bitumen is too wide a subject to discuss here in detail; yet it may be said in general that sulphur enters bitumens by a secondary reaction between the bitumen and the sulphates dissolved in natural waters. The freedom of Pennsylvania petroleum from sulphur has already been shown to be due to the absence of sulphates in the natural waters of the region in which they occur. As has already been stated, Prof. Mabery has shown that the sulphur compounds found in Lima oil are sulpho-paraffines. This would naturally follow the reduction of sulphates by paraffines, the reaction being a double decomposition in which sulphur is substituted for hydrogen in the paraffine. Filtration would not be likely to remove such compounds from solution in the other constituents of the petroleum.

In his discussion of the "Occurrence of Petroleum in the Cavities of Fossils," Mr. Phillips has offered some ingenious but wholly unnecessary suggestions to account for the presence of a nearly solid bitumen in the cells of a coral reef uncovered in a quarry. Petroleum occurs in the rocks of the oil regions filling cavities of every description. Geodes, fossils, sandstones, pebble conglomerates, porous limestones, the Chicago dolomite, gravel, anything and everything that has a cavity or a pore, has been found saturated with it. Why? Simply because the enormous pressure under which the bitumen has accumulated in the crust of the earth has

[1] *Ann. des Mines* (5), iv, 334.

forced it there. When it has entered cavities like those in the coral reef described by Mr. Phillips, the diminished pressure and evaporation have resulted in the escape of the most volatile constituents. When the reservoir of the Bradford field was first penetrated, the pressure was estimated at 4000 pounds to the square inch. Whether or not this estimate was approximately correct, the pressure was sufficient to throw the well casing and piping out over the top of a derrick and land it in a meadow near by. A short time after the famous Karg well was struck near Findlay, O., I, myself, saw a pressure gauge register 450 pounds per square inch. Burning gas wells in western Pennsylvania sent streams of flame into the air eighty feet in height. Notwithstanding this accumulation of the facts of experience during many years, writers still ignore the tremendous significance of such phenomena, and speak of these deposits of bitumen as if they resembled a turn-over or an apple-dumpling laid away by nature. Gas cannot have been held under such tremendous pressure through cycles of geologic time in reservoirs of porous rocks, from which it has been filtering, as suggested by Mr. Phillips.

The complete inadequacy of all these arguments was never more fully set forth than in the language used by Mr. Phillips: "The movement of the oil through the rock displaced from the interstices in which it had originally collected would have been accelerated as the transition from solid organic tissues to liquid had been advanced." The decomposition of organic matter *in situ* could never have occurred under any conditions of accelerated pressure of even moderate amount. The rocks must have been consolidated and capable of resisting pressure before, action and reaction being equal, the pressure could accumulate. These facts are themselves the strongest reason for belief that the bitumens were never formed *in situ* in the porous rocks that contain them, but were gradually accumulated in those porous rocks that had been previously overlaid with impervious strata capable of resisting the enormous pressure until the reservoirs were penetrated by the drill. The fact that in the limestone some fossil cavities are filled while others are empty lies in the further fact, that the lines of shrinkage and other fractures penetrated some of the fossil cavities while others remained intact.

22. Upon this hypothesis, that bitumens are distillates, all of the variations observed in bitumens of different geological ages are

easily explained. The earliest forms of animal and vegetable life are admitted to have been nearly destitute of nitrogen; hence when these forms accumulated in sediments, which, borne down by deposits above them, invaded an isothermal that admitted of their distillation, they must have been distilled, in the presence of steam, at the lowest possible temperature; they must have been distilled under a gradually increasing pressure, the extent of which depended upon the porosity of the sediments above them, up to the surface. They must also have been distilled under a gradually increasing temperature which would have been largely controlled by the pressure. While the temperature and the pressure would have in every instance been the least possible, with steam always present, these physical conditions would on account of the varying porosity and consequent varying resistance of the overlying mass have produced very great effects in some instances and very slight effects in others. As a consequence, we have in natural bitumens, as in artificial distillates, materials varying in density from natural gas to solid asphaltum.

If these distillates proceeded from materials that would yield paraffine, these permanent and stable compounds, from marsh gas to solid paraffine, remained in the receptacles that nature had provided for them until they were released by the drill. If, however, the distillates proceeded from sediments of a different geological age, containing animal and vegetable remains more highly organized, that would yield different series of hydrocarbons, with compounds of nitrogen, then a very different bitumen would be stored in these receptacles. Secondary reactions would convert these primary distillates into a great variety of substances. The contents of the original reservoirs, borne down and invaded by heat, might become involved in a second distillation at an increased pressure and temperature. Fractures of these reservoirs from excessive pressure might lead their contents to the surface along lines of contact of strata or with water containing sulphates by which an originally pure hydrocarbon would be converted into a sulphur bitumen. A nitro-hydrocarbon, reaching the surface under these conditions, might, by the combined action of evaporation and reaction with sulphates, pass through all the varying degrees of density from petroleum to maltha and become finally solid asphaltum, and this through the lapse of time and abundance of material on a scale of vast magnitude.

23. Such, then, is the "Testimony of the Rocks," along a line which spans the western continent. Nearly the whole of this line has been brought under my own personal observation. There is also reason for believing that a line might be followed in the eastern continent from the North sea to Java that would furnish equally convincing proof. To this testimony is added that of chemistry, technology, mineralogy, and the chemistry of the cooling earth. Each supports and corroborates the other. We have no need to search for coke until we know that coke was formed. We have no need to assume, that in the laboratory of Nature high temperatures and rapid action were necessary to produce results, for which infinite periods of time and the lowest possible temperature were fully adequate.

24. Since this paper was written I am in receipt of the annual address of the President of the Geological Society of America—Dr. Edward Orton—read at Montreal, December 28, 1897; from which exhales the exquisite aroma of fine literature, as from all the other productions of its accomplished author.[1] In this address I note two very important observations. He says, in speaking of Mendelejeff's chemical hypothesis, "It is hard, therefore, to see why, the whole world over, petroleum is entirely wanting in the Archean and exclusively confined to the stratified rocks. There is not an oil field in the world in rocks of Archean time." I pass this by without comment to notice his observation upon the gas wells drilled in Oswego and Onondaga counties, N. Y., one of which penetrated a limestone that was found between the Pottsdam sandstone and granite, and furnished a gas pressure of 340 pounds; the other at a depth of 120 feet, in the Trenton limestone, gave the gas pressure of 1525 pounds. Dr. Orton well says, "A rock pressure of 1500 pounds to the square inch stands for, nay demands, a hermetic seal." Speaking of the Pottsdam sandstone and the dark limestone beneath it, he says, "The drillings brought from these horizons seem normal in every respect. Certainly there is no hint of any transformation by heat. 'The smell of fire has not passed on them.' There is no carbon residue. The bituminous products found in them cannot owe their origin to the usual form of destructive distillation." It is not likely, that the usual form of destructive distillation as illustrated in a gas retort has obtained anywhere in the operations of nature. I regard the penetration of granite

---

[1] *Bull. Geol. Soc. America*, ix, 93.

beneath bitumen-bearing rocks as a most conclusive and unexpected support to the validity of the views that I have herein set forth. I therefore, with this argument, for the present leave the subject.

NOTE.—I have quoted thus fully from Dr. T. Sterry Hunt for two reasons; with all his eccentricities, he was a man of untiring industry and a profound interpreter of the phenomena of nature in the light of experiment. Therefore, no writer of recent years has expressed views that are entitled to more respectful consideration. He is also more widely quoted by both American and European writers upon the subject of the origin of bitumens, especially as an exponent of the doctrine that bitumens are indigenous to the rocks in which they are found, than any other author.

HERPETOLOGICAL NOTES.

BY JOHN VAN DENBURGH.

(Read April 1, 1898.)

1. *Bufo boreas in Alaska.*—In the winter of 1896, Mr. A. W. Greeley, a student at Leland Stanford Junior University, gave me for examination two toads which he had "taken swimming in a large lake near Prince William's sound, Alaska, July 15, 1896." These are typical specimens of *Bufo boreas*, distinguishable at a glance from *Bufo halophilus*, and its northern form *B. h. columbiensis*. Unless my memory fails me, no toad has heretofore been recorded as Alaskan, and these specimens are, therefore, of great interest, since they greatly extend to the northward the known range of this family, genus and species upon the Pacific coast.[1] One of these specimens contains eggs which must have been nearly ready for laying.

2. *On the Time of Laying of the Western Gopher Snake in Central California.*—Early in the month of July, 1897, I received a fine, moderately large specimen of the Western Gopher Snake (*Pituophis catenifer*), which had been captured a few days before "in a marsh near Palo Alto," Santa Clara county, Cal. During the next few days this snake lay almost motionless in a small box in my office in the California Academy of Sciences. On the afternoon of

[1] Toads have been reported from Gt. Bear Lake.

July 13, however, it became very restless and seriously injured its snout in attempting to find some hole through which it might escape from its prison. The next morning—July 14—to my surprise, several eggs were in the box, and the number was added to at intervals until by noon of the next day nineteen eggs had been laid.

The eggs when first laid are covered with a loose, soft, sticky, parchment-like white membrane. This quickly dries and hardens, shrinking upon the substance of the egg until quite tense, and cementing each egg to the others upon which it is laid. After the membranous shell has become dry it ceases to shrink, and if the substance of the egg be reduced, as by evaporation, wrinkles appear upon its surface. However, the softness of the shell and its power to shrink upon its contents are restored by the application of water.

The eggs as laid formed a great cluster surrounded by the coiled body of the snake. The latter hissed fiercely when the eggs were removed, although she had not shown the slightest resentment when handled on previous days.

3. *The Breeding of Plethodon oregonensis.*—A female salamander of this species with three eggs was brought to me from Mill Valley, Marin county, Cal., where it had been found April 19, 1896. The gentleman who secured them stated that the salamander and eggs had been found together under a decaying log in the redwood woods. These eggs, like those of *Autodax iecanus*,[1] are very large (6 mm. in diameter) and almost or quite without pigment. They were covered with a thin gelatinous coating which caused them to stick together. In my office they were placed with the salamander and some bits of wood and damp moss in a darkened jar. This situation, however, proved to be unsuited to their development, for the eggs soon became covered with mold. The most interesting fact remains to be told. As soon as placed in the jar the salamander took charge of the eggs, lying beside them and holding them in a loop of its tail. Evidently dissatisfied with their position and surroundings, the Plethodon moved the eggs from place to place in the jar, holding them always in the crook of its tail. This was done several times in the course of three or four days, and the solicitousness of the salamander continued until the eggs were quite moldy. Finally the eggs of the cluster were broken apart and one was eaten by the salamander. Thinking it probable that this sala-

---

[1] See *Proc. Cal. Acad. Sci.* (2), v, 1895, p. 777.

mander was a male, I examined it with care, but found that it was a female with well-developed ovaries containing ova of various sizes.

4. *The Colors of a Living Specimen of the Lower Californian Boa, Lichanura trivirgata.*—The California Academy of Sciences recently received, through Mr. F. Billa, a fine specimen of the Lower Californian boa, collected near San José del Cabo. This specimen shows beyond doubt that *Lichanura trivirgata* is perfectly distinct from *L. roseofusca* of northern Lower California and southern California and Arizona. It agrees in coloration with the specimen still in the Philadelphia Academy of Natural Sciences. The snout is strongly protruding. The diameter of the eye is one-third the distance from the orbit to the end of the snout. The true loreals are two on the left and three on the right side. Scale rows forty-one. Gastrosteges two hundred and seventeen.

The following description of its colors was prepared while the snake was yet alive:

Two bands of rich drab-gray, with a slight creamy cast, separating the very dark seal-brown ground color into three longitudinal stripes. Belly and sides creamy white, irregularly dotted and blotched with seal-brown. Head pure drab-gray, with markings of seal-brown above, uniform whitish below.

This snake had the curious habit, often shown by Charina, of coiling itself into a compact mass or ball when disturbed.

5. *On the Type Specimen of Crotalus oregonus.*—In the collection of the Philadelphia Academy of Natural Sciences is a jar which bears two labels, as follows:

Crotalus oregonus Holb., *N. Amer. Herp.*, Vol. iii, Pl. 3. Mr. Nuttall. Type. Oregon.

Crotalus oregonus Holb. 840. Type. T. Nuttall. Oregon.

This jar contains a young rattlesnake which agrees with the original description of *Crotalus oregonus* in all respects except in length and the absence of rattles. The total length is only fourteen and one-eighth inches. I see no reason to doubt that this is the type of *Crotalus oregonus*.

This specimen exhibits all the characters of the species long known under the name *Crotalus lucifer*. The light postocular stripe is more than two scales wide and the dark streak below it begins below the middle of the eye. The snake now almost universally known as *Crotalus lucifer* must, therefore, in the future be called *Crotalus oregonus* Holbrook.

Stated Meeting, April 15, 1898.

Vice-President SELLERS in the Chair.

Present, 12 members.

Donations to the Library were announced and thanks were ordered for the same.

Letters were received from Mr. Robert Patterson, presenting a volume of photographs of the Peale collection of Indian relics in the possession of the Society. It was moved that the best thanks of the Society be given to Mr. Patterson for his gift of the photographs of the Peale collection. Carried.

From Mr. Rosengarten, donating portraits of the Hon. Frederick Fraley and Prof. J. P. Lesley, on behalf of C. C. Harrison, John B. Gest, J. E. Gillingham, Charles Hartshorne, A. T. Freedley, M. H. Messchert, C. H. Clark, John S. Jenks, J. V. Merrick, James P. Townsend, Frank Thomson, Charles Wharton, Alfred C. Harrison, George C. Thomas, Alexander Biddle, Henry N. Paul, W. D. Winsor, W. P. Tatham, Samuel Dickson, Herbert M. Howe, W. W. Frazier, Fanny Rosengarten, Lincoln Godfrey, N. Parker Shortridge, W. V. McKean, John Wanamaker, James C. Brooks, Maria Blanchard, C. S. Wurts, C. A. Griscom, Helen C. Jenks, Coleman Sellers, Robert Patterson, George F. Edmunds, James W. Paul, Jr., and J. G. Rosengarten.

On motion it was *Resolved*, That the best thanks of the Society be presented through Mr. Rosengarten to the donors of the portraits of the Hon. Frederick Fraley and Prof. J. Peter Lesley, and that Friday evening, May 20, be assigned for their formal presentation and acceptance.

Mr. Edmunds, by unanimous consent, presented the report of the Committee appointed on December 3, 1897, to revise the Laws of the Society, and offered the following motion: "*Ordered*, That at the next stated meeting of the Society, the subject of the revision and amendment of the Laws, Regulations and Ordinances of the Society shall have priority of all other business except the reading and approval of the minutes, and if not completed shall have the same priority until disposed of." Carried.

Dr. Hays read a paper entitled "A Journal Kept During the Siege of Fort William Henry, August, 1757."

A paper by Mr. R. H. Mathews was read on "The Divisions of Australian Tribes."

A JOURNAL KEPT DURING THE SIEGE OF FORT WILLIAM HENRY, AUGUST, 1757.

BY I. MINIS HAYS, M. D.

(*Read April 15, 1898.*)

One hundred and fifty years ago the French claimed all of North America from the Atlantic coast range to the Rocky mountains and from Mexico and the Gulf to the northernmost limit, and they had planted flourishing colonies at the mouth of the St. Lawrence and of the Mississippi to control these great waterways, with their tributaries, to the North and West. These vast possessions, which they called New France, had a white population of about 80,000 souls.

The thirteen British colonies were scattered along the Atlantic seaboard from Maine to Georgia, with a white population of about 1,160,000, who were continually extending further and further inland and encroaching upon the undefined area beyond the mountains claimed by both French and English. To maintain their territorial claims by force of arms, with the aid of their numerous Indian allies, and to keep in check the British colonists with their vastly larger population, and to drive back those who were already intruding into the broad valley of the Ohio, the French established a chain of forts and trading posts from Canada to Louisiana. They recognized that the fork of the Ohio and Niagara were the gateways to the great West and they therefore strongly entrenched themselves at these points. Lake Champlain and Lake George on the direct line between Montreal and New York, controlling the gateway to the Hudson, were also important strategic points for the mastery of which both French and English stubbornly contended. In September, 1755, Gen. Johnson defeated the French under Dieskau at the battle of Lake George, and in the following spring

Montcalm was sent out to command the French forces and to retrieve their fortunes. Ticonderoga at the head of Lake Champlain was their most advanced post, while the British troops were entrenched at Fort William Henry at the head of Lake George.

Montcalm in planning his campaign for the summer of 1757 determined, with the aid of his Indian allies, to drive the English back from Lake George, perhaps to capture Fort Edward, fourteen miles to the south, and even to make a demonstration against Albany. In the latter part of July he concentrated his forces at Ticonderoga, and on the 1st of August, with about 7600 men, of whom more than 1600 were Indians, he started his expedition against Fort William Henry, which was commanded by Lieut.-Col. Monro, a brave Scotch veteran, and garrisoned by a force of little more than 2000 men. Gen. Webb was in command at Fort Edward with a force of about 1600 men, with half as many more distributed at Albany and the intervening forts. He promised his assistance, and Col. Monro had every reason to expect it, when Fort William Henry was attacked, but he failed at the last moment to give that support which it was his duty to have rendered. The rest of the sad story is told in the accompanying Journal which was recently found among the papers of Col. James Burd in the possession of this Society.

Col. James Burd was the third son of Edward Burd, a Scottish gentleman, who lived on his estate of Ormiston, near Edinburgh, by his wife, Jane Halliburton, a daughter of the Lord Provost of Edinburgh. He married Sarah Shippen, daughter of Edward Shippen, of Lancaster, Pennsylvania. He held a prominent position in the military forces of this colony, and at the time of the French attack on Fort William Henry he commanded Fort Augusta at the fork of the Susquehanna on the site of the present town of Sunbury, which was one of the long chain of forts that had recently been built by the Province of Pennsylvania to protect its territory in the war with the French and Indians.

Although the individual colonies maintained their independence they were forced to coöperate against the common foe, and the commanders of the frontier posts were kept advised of the movements of the enemy at all points along the line. The following interesting letter from Capt. Thomas Lloyd, also found among the Burd papers, conveyed to Col. Burd information in reference to the French attack on Fort William Henry:

TO MAJOR JAMES BURD, ESQUIRE.

PHILADELPHIA, August 9, 1757.

Sir:—We have just now recd. an Express from York informing that Governor De Lancy has marched with an Escort to be shortly follow'd by the whole Militia of that Government and a Demand made of a thousand from the Jerseys to the relief of Fort William Henry which is now invested by two thousand five Hundred french regulars four thousand five hundred Canadians and two thousand Indians with a Train of 36 Cannon and Five mortars against all which damn'd execrable Combination tis Impossible for that Fortress to hold out and the next news that arrives we expect will confirm their mastery of it. I need tell you no more than that I am Sir Yours etc.

T. LLOYD.

Endorsed as "Rec'd 10th Sept. 1757."

It can be readily understood that this accompanying Journal of the capture of Fort William Henry and the subsequent massacre its garrison had a deep personal interest to Col. Burd, which suffices to account for its having been copied and sent to him. Fortunately he was a man of methodical habits and appears to have made a custom of filing and keeping all papers coming into his possession. Hence this copy has been preserved, while the original is unpublished and unknown, and has probably been lost or destroyed.

The French records give full data concerning the capture of Fort William Henry, but accounts written by observers on the English side are very few and, with the exception of Col. Frye's Journal,[1] most meagre. The accompanying Journal by an unknown writer who was evidently an officer within the fort has considerable historical value in not only confirming Col. Frye's account, but also in furnishing some additional details to complete the picture of the bravery of Col. Monro, of the incapacity of the British commander at Fort Edward, and of the treacherous apathy of the French in the face of the savage cruelties committed by their Indian allies on their capitulated foe.

---

[1] *The Port Folio*, May, 1819, p. 356.

Copy of a Journal Kept During the Siege of Fort William Henry.

Tuesday }
August 2^{d} 1757 }

In the Evening Col. Young of the 3^{d} Battalion of the Royal Americans and Co^{l} Fry of the N. England Forces came to the Camp at lake George with a reinforcement of 1100 men Regulars and Provincials making with what we had before upwards of 2400 men the whole under command of Col. Monro of the 35th Regiment.

Lieut. Forty of the 35th Reg^{t} and Cap^{t} of one of ye gallies detached 14 of his Sailors to reconitre the lake this Evening who returned about midnight and reported that they saw a large number of the Enemys Boats which gave them chace and had like to have been taken. During this night the Camp was frequently alarmed by the Enemys firing on our Centurys.

Wednesday 3^{d} Early this morning our Century discovered a large number of Boats on the lake close under a point of Land on the west shore distance about 5 miles upon which we fired our warning Guns (32 pounders) a Signal agreed on upon the approach of the Enemy. The French fired at the fort from their Boats lying at the point but their Shot did not reach half way: At this point the Enemy landed their forces and Artillery. This morning we brought in our live Stock put them into the Picquet Store yard but being neglected afterwards strayed and fell into the Enemy's Hands.

Cap^{t} W^{m} Arbuthnot was ordered out with a Party of his N. England Forces to burn and destroy some Huts and Hedges on the west of the Fort, which he did with difficulty. Nine o'Clock discovered a number of French Regulars marching S. W. near the foot of a Hill distant about 1000 yds which we apprehended were intended to cut off our Communication with Fort Edward. Lieu^{t} Collins of the Royal Regiment of Artillery gave orders to cannonade them as they marched which was done. Our rangers and a party of Provincials were Smartly engaged with enemy S. W. of the Camp on the Ground w[h]ere S^{ir} W^{m} Johnson engaged and beat the Enemy in the year 1755 and beat them off several times.

Twelve o'Clock we could plainly see from the Fort that the Enemy were throwing up an entrenchment and erecting a Battery at the distance of about 7 or 800 yards on a Clear Ground bearing

N, B, W, Saw several large Boats coming to the Point w[h]ere the Enemy landed.

Two o'Clock Mons^{r} Mont Calmn sent an officer with a Flag to demand the Fort but the brave Col^{o} Monro rejected the Summons with Scorn. The Remainder of this day was spent in Bombarding the Enemys works, Capt. McCloud commanding and cannonading. The Artillery fired Several Shot from the Camp which did great Service in beating back the Indians. One of our Balls fell on an Indian Hutt and killed many.

Tuesday [*sic*] 4th Early this morning the Enemy's works were in great forwardness with a ten Gun Battery almost finished. Their Entrenchment approached towards the Fort thus ∿∿∿∿∿∿∿∿ Saw several large Boats coming to the Point w[h]ere the Enemy landed from Ticonderoga: this day we had several Skirmishes from all quarters in which our people behaved with great Bravery, a mortar being pointed towards another Indian Hutt fell on it and killed Several. During this day we cannonaded the French Battery and threw a large number of Shells into their Entrenchm^{ts} The Artillery at the Camp kept a Constant fire on the Enemy as they came to Attack our out Guards and Rangers who drove them off into the woods. The Rangers brought in an Enemy wounded Indian but he soon died.

Friday 5th This morning the Enemy began to cannonade our Forts with nine pieces of Cannon 18 & 12 pounders. It was some Time before they could find their mark. At Eleven they tried their Shells, mostly 13 Inches diameter, which fell short but towards the afternoon they got their distance very well, several of their Small Shells falling into the Parade. One of their Shott carried away the Pully of our Flag Staff and the falling of our flag Much rejoyced the Enemy; but it was soon hoisted tho' one of the men that was doing this had his head Shot off with a Ball, and another wounded. A part of the Enemy and their Indian [allies] advanced near our Camp on which the brave Cap^{t} Waldo of the N. England forces went out to take Possession of a piece of rising Ground near the wood on which a brisk fire unsued on both sides. Col. Monro sent out a second party to Surround the Enemy, but they were forced back and the Enemy advanced up to our quarter Guard. Capt. M. Cloud brought his Cannon to bear upon them soon dispersed them. Here an unlucky accident happened, as some of our men were returning to Camp were taken for the enemy and fired upon by which Several were killed & wounded. During this Attack poor Capt Waldo was Shot and Soon Expired. Capt Cunningham of the 35th Regt was wounded in the right arm.

Saturday [6th] Last night the enemy carried on their Entrenchmts and Erected a Battery of 10 Guns mostly 18 Pounders about 6 or 700 yards from us bearing N. W. both of Cannon & Mortars. This was the hotest days action from all quarters; tho' as yet our Garrison remained in high spirits expecting Sir W. Johnson with the Militia and Gen. Liman with the N. England Forces to the number of 3 or 4000 men which we heard were on their march with some more Cannon. Would to God they were permitted to come as their Good will was not wanting. A party of Indians were seen advancing with great Speed towards the road that leads to fort Edward which Confirmed us in our Belief of a Relief.

About 11 o'Clock Monsr Montcalm sent an officer with a Flag, with a letter that was intercepted by the above mentioned Indians from Genl Webb wrote by his Aid-de-Camp Mr Bartman to Col: Monro acquainting him that his Excellency could not give him his assistance as the Militia had not yet come up to Fort Edward, &c. The French officer delivered an other letter from Montcalm acquainting Col: Monro that he came from Europe and Should Carry on the war as a Gentleman and not as the Savages do "but like a true Frenchman, both broke his word and Articles of Capitulation as will appear in the Sequel of this relation. During this interval the Enemy made a Shew of all their Indians, about 1200, on a rising Ground about 250 yards distance bearing S: W: which [while] their Engineers reconitred our old Camp Ground which was afterwards a great Advantage to them. As soon as their Officer returned they began their fire in good Earnest which we returned with the utmost bravery. This day we Split two of our heaviest Pieces of Cannon (vizt 32 pounders) and our largest Mortar was rendered useless which was very unlucky for us as we could not be Supplied with others in their place. This day Colo Monro published his orders to all in the Fort that if any person proved cowardly or offered to advise giving up the Fort that he should be immediately hanged over the walls of the Fort and he did not doubt but the officers in the Garrison would stand by him to the last and that he was determined to stand it out to the last or as long as two Legs were together.

Sunday 7th The Enemy continued plying us very hard with their

Cannon and Bombs while the Compliment was returned by us with all our Artillery, still hoping for a Reinforcement from Fort Edward. A Shell fell into the South Bastion broke one man's Leg and wounded another; Split one of our 18 Pounders and burst a Mortar. Several of the Enemys Shells fell near the Camp S. S E of our Fort about 400 yards distance and on a line with the fort from the Enemys two Batteries, so that their Shot missing the Fort could Strike the Camp. It appeared that the Enemy could throw their Shells 1300 yards. A Shell fell amongst the officers whilst at dinner, but did no other mischief than Spoil their dinner by the dirt it tore up. Another Shell fell into the east or flag Bastion and wounded two or three men.

Monday 8th We now began to believe we were much slighted, having received no reinforcement from Fort Edward as was long expected. The Enemy were continuing their Approaches with their Entrenchments from the 2d Battery towards the Hill on our old Camp Ground, where they were erecting a third Battery, which would have greatly distressed us: There were frequently during these last 2 or 3 days smart skirmishes near our Camp, but we beat them off the Ground. This night we could hear the Enemy at Work in our Garden, on which some Grape Shott was sent in amongst them, which had good Effect as it drove them off, however they had got their 3d Battery almost finished by Day Light.

Tuesday 9th This Day the Enemies Lines were finished, parallel to our West Curtain in the Garden, Distance about 150 Yards. Col. Munro, after a Council of War had been convened, wherein the Officers were of Opinion, that the Loss of our heavy Cannon viz: 2, 32 pounders, 1, 24 pounders, two 18 pounders, one 9 pounder & 3 Mortars bursting would render it impossible to defend the Fort much longer, as the Enemies Batteries had increased and our Metal failing us, & no help coming, wherefore it was thought advisable that a white Flag should be hung out in order to capitulate; which was done accordingly, and the firing ceased: The Enemy very readily granted the Capitulation: had Monsieur Montcalm been a Man of Honor, he would have performed his part; but instead of that such a Scene of Barbarity ensued as is scarce to be credited: After the Articles were agreed on & signed, the Officers left the Fort to a Regiment of the French Regulars who were ready at the Gate, thro' which we marched with most of our valuable Effects & Arms to the Camp and in the Evening three Companies of the

35th Regim^{t} had marched out & the other three Companies were on their march out of the Breastwork, when we received Orders to return to our Posts again where we remained till next morning.

Wednesday 10th This morning the Marquis MontCalm being desirous of our being eye witnesses of how well he was able to perform his part of the Capitulation (see the 7th Article), the Indian Doctors began with their Tomhawks to cure the sick and wounded. They began to seize on all the negroes and Indians whom they unmercifully draged over the breast work and scalped. Then began to plunder Col^{o} Youngs and some other officers Baggage on which Col^{o} Monro applyed to Montcalm to put a Stop to these inhuman Cruelties but to no purpose, for they proceeded with out interruption in taking the Officers Swords Hats Watches Fuzees Cloaths and Shirts leaving quite naked and this they did to every one they could lay hands on. By this time the 35th Reg^{t} had almost formed their line of March and the Provincials coming out of the breast work the French officers did all they could to throw them into Confusion alledging as soon as the Indians had done stripping them they would fall on and scalp them which thru [*sic*] them in a panick that rushed on the front and forced them into Confusion, the Indians pursued tearing the Children from their Mothers Bosoms and their mothers from their Husbands, then Singling out the men and Carrying them in the woods and killing a great many whom we saw lying on the road side. The greates[t] part and best of the plunder was brought to the french General. Our officers did all in their power to quiet our Soldiers advising them not to take notice but suffer themselves to be stript without Resistance lest it should be Construed as a Breach of our part of the Capitulation and those that were in the rear Should fall a Sacrifice to their unbounded fury. Those therefore that had been able to perserve their arms carried them clubed. The French it is true had a detachm^{t} of their men drawn up as is mentioned in the 1st & 6th Article of Capitulation but their only business was to receive the plunder by the Savages.

FINIS.

DIVISIONS OF AUSTRALIAN TRIBES.

BY R. H. MATHEWS. L.S.

(Read April 15, 1898.)

In 1891, my attention was drawn by an article contributed to the Royal Society of South Australia,[1] by the Rev. L. Schultze, to the existence of eight classes or divisions among the native tribes inhabiting the Finke river in South Australia. On making further inquiries, I found that this eight-class system, with different modifications, extends northerly from the Finke river almost to Port Darwin and the Gulf of Carpentaria. It also prevails in a westerly direction, from the boundary of Queensland to that of West Australia, and may therefore be said to be in force over the greater part of the Northern Territory—a name given to the northern portion of South Australia.

Owing to the great apathy regarding native customs shown by the white population sparsely distributed over this immense tract of country, I have experienced much difficulty in obtaining particulars respecting these classes. Among my correspondents I was, however, fortunate enough to find Mr. S. N. Innes, the owner of a station in the Northern Territory. He had read a paper on the class systems of other tribes contributed by me in 1894 to the Geographical Society at Brisbane,[2] which had awakened his interest in the subject, and when I wrote to him he willingly offered to collect particulars of the divisions among the natives in his district.

The tribes reported upon by Mr. Innes are divided into eight classes or sections—the names of the women being slightly different from those of the men in each section. Four of these sections form a group, which may be called A, and the other four sections become group B. This division will be readily understood by means of a table.

It will be seen by the accompanying table that the women of group A are the mothers of the men of group B, who marry the women belonging to the latter group. The women of group B are likewise the mothers of the men who marry the women of group A. In other words, the sons of the women of one group marry the daughters of the women of the other group. Or, what amounts to the same thing, the men of group A marry the sisters of the men of their own generation in group B, and *vice versa*.

---

[1] *Trans. Roy. Soc. S. Australia*, xiv, 210–246.

[2] *Proc. Roy. Geog. Soc. Aust.*, Queensland, x, 18–34.

Group.	*Husband.*	*Wife.*	*Children.*	
			Sons.	*Daughters.*
A	Choolum Jamerum Cheenum Yacomary	Ningulum Palyareenya Nooralum Bungareenya	Palyarin Chooralum Bungarin Chingulum	Palyareenya Nooralum Bungareenya Ningulum
B	Chingulum Bungarin Chooralum Palyarin	Noolum Yacomareenya Neenum Neomarum	Yacomary Cheenum Jamerum Choolum	Yacomareenya Neenum Neomarum Noolum

On examining the table further it will be observed that the daughters of the women of group A belong to the same group as their mothers, but to a different section or class of it. For example, Ningulum has a daughter Palyareenya; Palyareenya produces Nooralum; Nooralum produces Bungareenya; Bungareenya is the mother of Ningulum, and this series is continually repeated. The women of the A group pass through each of the four classes in as many generations—the same class name reappearing in the fifth epoch. If our example had been taken from the B group, an analogous result would have been obtained.

When on the Culgoa river some years ago I collected some information respecting a large tribe speaking the Moorawarrie language, who occupy the country from about Goodooga on the Bokara river to Barringun on the Warrego, extending southerly about fifty miles and northerly into the Queensland frontier about the same distance. They are divided into four sections, having the same names for the men and women as those of the Kamilaroi tribe, with rules of marriage and descent as exemplified in the following table:

Husband.	*Wife.*	*Sons and Daughters.*
Ippai,	Kubbitha,	Murri and Matha,
Kumbo,	Matha,	Kubbi and Kubbitha,
Kubbi,	Ippatha,	Kumbo and Butha,
Murri.	Butha.	Ippai and Ippatha.

The whole community is divided into two groups—the members of the Ippai and Kumbo sections forming the one, and the Kubbi and Murri people constituting the other. The families composing these groups bear the names of different animals, plants, or inanimate objects, which are called *totems*, a word copied by us from the North American Indians. Among the totems of the people constituting the Ippai and Kumbo sections may be mentioned the following:

Wirroo (parrot),
Emu,
Native Dog,
Codfish,
Bream,
Gray Frog,
Common Fly,
Spider,
Plover,
Curlew,
Water Hen,
Sun,
Rain,
North Wind,
Birribil,
Doomul,
Gidyer,
Myall,
Kurrajong,
Supple Jack,
Tea Tree,
Lime Tree,
Nardoo (Bah),
Pig-weed,
Bilbee,
Gray Kangaroo,
Jewfish,
Swan,
Native Companion,
Jew Lizard,
Galah,
Kangaroo Rat,
Grasshopper,
Cocklarina,
Copi (Moganderra),
Hail,
Rainbow,
West Wind,
Numumbeera,
Mulga,
River Gum,
Belar,
Quandong,
Whitewood,
Hop Bush,
Yams,
Blue Grass,
Sensitive Plant,
Mulga Snake,
Red Kangaroo,
Bronze-wing Pigeon,
Plain Turkey,
Common Ants,
Wood Duck,
Native Cat,
Top-knot Pigeon,
Muscle,
Bush Mouse,
Blue Bonnet (parrot),
Clouds,
Lightning,
Thunder,
Cuttibundi,
Carbeen,
Bloodwood,
Leopard Tree,
Grooee,
Greenwattle,
Wild Orange Tree,
Lignum,
Mitchell Grass.

The under-mentioned totemic names may be enumerated as belonging to some of the people comprising the Kubbi and Murri sections:

Ground Iguana,
Carpet Snake,
Eagle Hawk,
Fish Hawk,
Tree Iguana,
Crow,
Scrub Turkey,
Common Magpie,
Padamelon,
Brown Snake,
White Cockatoo,
Dove,
Porcupine,
Death Adder,
Silvery Fish,
Black Magpie,
Opossum,
Black Duck,
Pelican,
Bower Bird,
Black Snake,
Native Bee,
Flying Squirrel,
Green Frog,

Cross Frog,
Mopoke,
Centipede,
Ibis,
Diver,
Butterfly,
South Wind,
Midjeree,
Ironbark,
Apple Tree,
Cherry Tree,
Nepon Tree,
Shingle-back,
Turtle,
White Crane,
Crimson-wing Parrot,
Wood Adder,
Bull-dog Ant,
East Wind,
Brigalow,
Pine,
Box,
Wirribil,
Jackass,
Wasp,
Blue Crane,
Shag,
Scorpion,
Moon,
Quartz Stone,
Coolaba,
Sandalwood,
Mungal,
Barley Grass.

East of the Moorawarrie is a large tribe speaking the Uollaroi dialect; they have the same sectional divisions as the former, and with some variations their totems closely agree. In both tribes descent is reckoned through the mother. In gathering the particulars respecting the Moorawarrie tribe, now for the first time published, I desire to thank Mr. J. E. Miller, of Goodooga, for his willing assistance.

Stated Meeting, May 6, 1898.

Vice-President PEPPER in the Chair.

Present, 12 members.

Dr. Edward Pepper was presented to the Chair, and took his seat as a member.

A communication entitled "Contributions to a Revision of the North American Beavers, Otters and Fishes," by Samuel N. Rhoads, was presented for publication in the *Transactions*. It was referred to a Committee consisting of Mr. Arthur E. Brown, Mr. Pilsbry and Dr. Jayne.

Mr. Edmunds made a statement on behalf of the Committee on the Amendments of the Laws, and moved that when the Society adjourn, it adjourn till 3 P.M. on Friday, May 13. Carried.

Adjourned Meeting, May 13, 1898.

Vice-President PEPPER in the Chair.

Present, 27 members.

The consideration of the amendments to the Laws being in order, Mr. George F. Edmunds, on behalf of the Committee proposing the amendments, made a statement concerning the amendments proposed, and on motion the Laws and Ordinances were adopted in conformity with the Charter as follows:

THE LAWS OF THE AMERICAN PHILOSOPHICAL SOCIETY.

CHAPTER I.

OF THE MEMBERS, AND MANNER OF THEIR ELECTION.

SECTION 1. The election of members shall be by ballot, and shall form part of the stated business of the meetings on the third Fridays of February, May, October and December.

2. A member may, at any meeting, nominate in writing a candidate for membership, and the nomination so made may, in like manner, be concurred in by other members. The board of officers and council may also nominate candidates for membership; and such nominations shall be certified to the Society by a minute thereof in writing, attested by the clerk of said board.

3. No person shall be balloted for, unless his nomination, with the names of the members proposing him, or the minute of the board of officers and council, made as aforesaid, shall have been publicly read to the Society at the two stated meetings preceding that at which the balloting takes place. Nor shall any person be deemed duly chosen unless three-fourths of the votes given shall be in his favor.

4. Before entering upon an election for members, one of the secretaries shall read the names of the several candidates; and any member may then, for the information of the Society, speak to their character and qualifications for membership.

5. The names of the candidates and their places of abode shall be designated on the ballots, and the names of the officers shall be

called, in the order of their seniority, by the acting secretary, the members thereafter depositing their ballots. The name of a candidate struck from a ballot or not voted for shall be considered as a vote adverse to that candidate.

6. At the conclusion of the balloting the ballot box shall be opened by the secretaries, or, in their absence, by two tellers to be appointed by the presiding member, who shall then declare to the Society the result of the poll.

7. The members are mutually pledged not to mention out of the Society the name of any candidate proposed, nor of any withdrawn or unsuccessful candidate; and the papers containing the names of the unsuccessful candidates shall be destroyed immediately after the election.

8. Every member, upon his introduction into the Society, shall be presented to the presiding officer, and shall subscribe the laws. The signatures of members to the Roll shall be deemed an agreement to adhere to the laws of the Society.

9. Such members as reside within thirty miles of the hall of the Society, shall pay an admission fee of ten dollars, and annually thereafter, on the first Friday of January, a contribution of five dollars; and such other members as desire to vote, may do so at any meeting, upon the payment of ten dollars and one year's dues; and they shall, thereafter, pay the annual contribution of five dollars. The payment of one hundred dollars at one time, by a member not in arrears, shall exempt him from all future annual payments.

10. Members-elect, residing within thirty miles of the hall, shall lose the right of membership unless they subscribe the roll, and pay their admission fee within one year after their election. Any member liable to an annual contribution, who shall neglect or refuse to pay the same for the term of one year shall be notified by the treasurer in writing, on or before the second Friday in January after such default, or as soon thereafter as may be, that his rights as a member are suspended; and in case the said arrears together with all contributions then due shall not be paid to the treasurer on or before the expiration of sixty days next after such notice, the membership of such defaulting member shall be forfeited, his name stricken from the roll, and reported to the Society by the treasurer.

CHAPTER II.

OF THE OFFICERS, AND MANNER OF THEIR ELECTION.

SECTION 1. The officers shall be a patron, a president, three vice-presidents, four secretaries, three curators, a treasurer, and twelve councillors.

2. The governor of the State of Pennsylvania shall be, ex-officio, the patron of the Society.

3. On the first Friday of January in every year, between the hours of two and five in the afternoon, as many of the members as shall have paid up their arrears due to the Society, and shall have declared their willingness to conform to the laws, regulations, and ordinances of the Society, then duly in force, by subscribing the roll, and who shall attend in the hall, or place of meeting of the society, within the time aforesaid, shall choose by ballot one president, three vice-presidents, four secretaries, three curators, and one treasurer; and at the same time and place the members, met and qualified as aforesaid, shall in like manner choose four members for the council, to hold their offices for three years. Nominations for the elective officers of the Society shall be made at the stated meeting next previous to the day of election. If there should occur a failure of qualified candidates so nominated, others not so nominated may be elected. All officers shall hold office, unless lawfully suspended or removed, until their successors are duly elected and accept.

4. No person residing within the United States shall be capable of being president, vice-president, secretary, treasurer, or member of the council, or of electing to any of the said offices, who is not capable of electing and being elected to civil offices within the State in which he resides.

5. Of the day, hour, and place of election, notice shall be given by a secretary at least one week before the day of election, in such one or more of the public newspapers of the State of Pennsylvania as the Society shall direct. At the stated meeting next before the election the Society shall appoint three of its members to be judges of the election, and also two clerks for taking down the names of the voters. If at the time of election there should occur a failure of the full number of judges or clerks to be present for the performance of their duties, the electors present shall appoint a member or members to fill up the number. The poll shall be opened at two o'clock in the afternoon and be closed at five o'clock in the afternoon.

6. A vacancy occurring in any elective office may be filled for the unexpired term by a vote by ballot taken at any stated meeting after notice of such vacancy shall be given and nominations made and entered in the minutes at a previous stated meeting. Notice that such election will be held shall be given in the notice of the meeting. At any such election the qualifications of voters shall be the same as at the annual elections. At such election three judges shall be appointed and the secretaries on duty shall act as clerks.

CHAPTER III.

OF THE PRESIDENT AND VICE-PRESIDENTS.

SECTION 1. The president and the vice-presidents shall perform such duties as the rules of administration and order shall prescribe.

CHAPTER IV.

OF THE SECRETARIES.

SECTION 1. The secretaries shall perform such duties as the rules of administration and order shall prescribe.

CHAPTER V.

OF THE CURATORS.

SECTION 1. The curators shall perform such duties as the rules of administration and order shall prescribe.

CHAPTER VI.

OF THE TREASURER.

SECTION 1. The treasurer shall perform such duties relating to his office as the rules of administration and order shall prescribe.

CHAPTER VII.

OF THE OFFICERS AND COUNCIL.

SECTION 1. The officers and council shall perform such duties as the rules of administration and order shall prescribe.

CHAPTER VIII.

OF THE LIBRARIAN.

SECTION 1. A member of the Society shall be chosen at the stated meeting on the third Friday of January in each year, to be the librarian of the Society. Nominations for said office shall be made at the first stated meeting in January, and no person shall be voted for who has not been so nominated, but if there shall have been a failure of qualified candidates so nominated, one of others not so nominated may be elected. The duties of the librarian shall be prescribed by the rules of administration and order of the Society.

CHAPTER IX.

OF THE MEETINGS OF THE SOCIETY.

SECTION 1. The stated meetings of the Society shall be on the first and third Fridays of every month from October to May inclusive, at eight o'clock in the evening. Special meetings may be called at any time by order of the president; or, in his absence or disability, by order of a vice-president. And it shall not be lawful to take up, consider or transact at such special meeting any business other than that which is specified in the call and the notice for the meeting. Should the time for any stated meeting, other than the meeting on the day of an annual election, fall on a legal holiday, such meeting shall not be held on that day, but shall be held on the next Friday.

2. Twenty qualified voters, of whom seven shall be members of the officers and council, present at any stated or special meeting, shall be a quorum, and be competent to elect members, dispose of property, appropriate money, and award premiums; but no property shall be alienated or encumbered, except by the vote of three-fourths of the qualified voters present, and given at two successive stated meetings. For the transaction of the ordinary business, the reception and reference of communications on literary, scientific, or other subjects, the members present shall be deemed competent to act, and shall form a quorum.

3. Those members shall be considered qualified voters at the meetings who have subscribed the roll and paid the admission fee, and who are not in arrears to the Society.

CHAPTER X.

OF STANDING AND SPECIAL COMMITTEES.

SECTION 1. There shall be chosen, at the stated meeting on the third Friday of January in each year, three members of the Society to be a committee of finance, five to be a committee of publication, three to be a committee on the hall, and five to be a committee on the library. Such other committees may be constituted from time to time as the Society shall think expedient.

2. The committee of finance shall have the general superintendence of the financial concerns of the Society. They shall consult with the treasurer, and with any custodian of the Society's property, and authorize and direct investments of its surplus funds. They shall always have access to his books, accounts, and vouchers ; and they shall annually audit the same, and on the second Friday of December file with the secretaries a full report on the state of the treasury, particularly distinguishing the several funds, and the income and disbursements of each, and recommending the amounts which should be appropriated for different objects of expenditure during the ensuing calendar year. They shall also have power, subject to the approval of the council, to remit the fees and contributions of members.

3. The committee of publication shall perform such duties in respect of publications as shall be prescribed by the rules of administration and order.

4. The committee on the hall shall perform such duties in respect of the hall and matters incidental thereto as shall be prescribed by the rules of administration and order.

5. The committee on the library shall perform such duties in respect of the library as shall be prescribed by the rules of administration and order.

6. No committee appointed on any subject of deliberation shall consist of less than three members; but any other matter may be committed to a single member. A majority of any committee shall be a quorum.

7. No officer or committee, or other body of the Society, shall have power to incur any expense, or to charge the Society with any debt or other obligation, without the authority of the Society previously given.

CHAPTER XI.

OF RULES OF ADMINISTRATION AND ORDER.

SECTION 1. Rules of administration and order not inconsistent with the charter and laws of the Society may be made and changed from time to time by the stated meetings ; but no rule shall be changed, rescinded or suspended otherwise than in the manner provided by the rules, or in respect of change or rescission, upon written notice publicly given at a stated meeting, showing the particular change or rescission proposed, and agreed to at the next stated meeting.

CHAPTER XII.

OF THE LAWS OF THE SOCIETY.

SECTION 1. No statute, law, regulation, or ordinance shall ever be made or passed by the Society, or be binding upon the members thereof, or any of them, unless the same hath been duly proposed and fairly drawn up in writing, at one stated meeting of the Society, and enacted or passed at a subsequent meeting, at least the space of fourteen days after the former meeting, and upon due notice in some of the public newspapers, and in notices sent by mail to the members whose addresses shall have been furnished to the secretaries, that the enacting of statutes and laws, or the making and passing ordinances and regulations, will be part of the business of such meeting.

2. Nor shall any statute, law, regulation, or ordinance be then, or at any time, enacted or passed, unless twenty members of the Society be present in addition to the quorum of the officers and council; nor unless the same be voted by two-thirds of the whole body present.

ORDINANCE NO. 1.

It is hereby ordained and declared that the foregoing twelve chapters shall be hereafter the laws of the Society. And all laws heretofore existing on the subjects embraced in the said twelve chapters and all ordinances, regulations, rules and orders inconsistent therewith be and the same are hereby repealed.

ORDINANCE NO. 2.

And it is further hereby ordained that all laws, regulations and orders of the Society not embraced in the foregoing provisions shall, for the time being, stand and be in force as the rules of administration and order of the Society until they shall be repealed or changed in conformity with the provisions of Chapter XI of the laws now enacted.

Mr. Edmunds moved that the Chair appoint a Committee of five members to report at the earliest practicable opportunity a body of rules of administration and order of the Society. Carried.

Mr. Dickson, Mr. Ingham, Dr. Hays, Dr. Jayne and Mr. Pettit were appointed as the Committee.

A report was presented from the Special Committee appointed on the paper of Mr. Rhoads, entitled "Contributions to a Revision of the North American Beavers, Otters and Fishes," in favor of its publication in the *Transactions*, and it was so ordered.

Stated Meeting, May 20, 1898.

Vice-President PEPPER in the Chair.

Present, 35 members.

Donations to the Library were laid on the table, and thanks were ordered for them.

Prof. Albert H. Smyth, presenting the portrait of Mr. Frederick Fraley, said:

It had been the intention and the hope of Mr. J. G. Rosengarten to be present this evening and in accordance with the request of the subscribers, to present to the American Philosophical Society two portraits, one of Mr. Frederick Fraley, our honored President, the other of Prof. John Peter Lesley, for many years a Vice-President of this Society.

But Mr. Rosengarten is prevented from being here, and has asked me to act in his stead.

In the long and distinguished history of the American Philosophical Society, fifteen Presidents, from Franklin to Fraley, have successively presided over its meetings and guided its policy. Portraits of all these—Franklin, Rittenhouse, Jefferson, Wistar, the Pattersons, the Baches, Tilghman, Duponceau, Chapman, Kane and Wood—hang upon our walls, together with many of that illustrious company who have contributed to the scientific and the literary glory of the Philosophical Society.

A little while ago several of the friends of Mr. Fraley, within and without this Society, desiring to express, as Hamlet says, their "love and friending" to him, and to place in the Hall of the Society over which he has presided with such zeal and success some token of their admiration and respect, learned that an excellent portrait of him had been painted.

Subscriptions were promptly made to a fund for the purchase of it and the portrait was obtained.

Upon the twenty-eighth of this month, Mr. Fraley, whose extraordinary activities cover well-nigh a century of time, will celebrate his ninety-fourth birthday; and this therefore being the meeting of the Society nearest to that happy anniversary has been chosen for the formal presentation.

In behalf of the subscribers, I present to the American Philosophical Society this portrait of Mr. Frederick Fraley.

Prof. Prime moved that the thanks of the Society be tendered to those gentlemen who presented the portraits, and that the said portraits shall be hung on the walls of the Hall, and shall be under the care of the Curators.

HAMPTON L. CARSON, Esq., in accepting the portrait of Mr. Fraley, in behalf of the Society, said:

The agreeable duty has been assigned to me of speaking in support of the Resolution of acceptance in behalf of the Society, and I respond with peculiar pleasure; first, because I am aware of the value of the services rendered to us for so many years by our venerable and venerated President, and next, because I cherish for him personally the most affectionate and reverential regard. I look back over thirty years of my own recollections, and I see him foremost in all measures tending to promote the commerce, finance, manufactures and mechanic arts of Philadelphia, and a leader in all movements to extend her civic industrial and educational influence. I look beyond into the history of the preceding forty years, and I still see him conspicuous, even at an early age, among many honored men who have long since passed to their reward.

At the age of twenty he was one of the founders of the Franklin Institute, and has been a member for seventy-four years. At the age of thirty he was a member of our City Council, serving as Chairman of the Finance Committee, a pilot standing at the helm with clear head and steady hand, during the troubled period of 1837. He was an earnest advocate, in opposition to the views of such men as Horace Binney, of the introduction of gas as a means of lighting our City. He was at his post in the State Senate during the Buckshot War, and was active in drafting the laws called for by our amended State Constitution. He was the author of the preamble of our Consolidation Act, and his skillful hand was present in the shaping of those sections which concerned the administration of our finances. He was a leader in the establishment of the Paid Fire Department, after having long served as a volunteer member of the old Philadelphia Hose Company. He was one of the founders of the Union Club, which developed into the splendid organization of the Union League. For forty-one years he has been a manager of the Western Saving Fund, and its President for twenty years. For forty-five years he has served as a trustee of the University of Pennsylvania. For fifty-six years he has been a member of this Society, and has been its President for eighteen years. As President of the National Board of Trade, and of our own local organization, as a member of the Board of Finance of the Centennial Commission, and in many other capacities, his voice has been raised and his influence has been exerted in unselfish devotion to the greatest of public interests.

His long and varied career stands for unbending integrity in the discharge of trust duties; for knowledge and power in the discussion of public questions; for breadth and liberality of opinion; for constant progressiveness and generous hospitality to new ideas; for lofty ideals supported by trained technical skill. He has walked on the high places of this earth with undimmed eye and steadfast courage. The loftiness of his position enabled him to see the tops of distant thoughts which men of common stature never saw. With him "Knowledge was not a couch whereon to rest a searching and restless spirit; nor a terrace for a wandering or variable mind to walk up and down with a fair prospect; nor a tower of state for a proud mind to raise itself upon; nor a sort of commanding ground for strife and contention; nor a shop for profit and sale, but a rich storehouse for the glory of the Creator and the relief of man's estate."

At the end of ninety-four years of life, with none of the intellectual infirmities of age, and without the slightest trace of acerbity of temper, he stands in the golden glow of an honorable and useful career, the central object of our affection, of our veneration and esteem.

It is fitting that his portrait should grace these walls—walls hallowed by sacred associations and cherished with filial piety.

"I would rather," said Hazlitt, "leave behind me a good portrait than a good epitaph." The sentiment is just. Those who read tombstone inscriptions are few, but those who can find inspiration in the study of a well-pictured face are many. This Society, grateful to the donors of this admirable portrait, will direct it to be hung beside those of the illustrious men who were his predecessors, in commemoration of the virtues, the talents and the services of Frederick Fraley.

Mr. **Smyth**, in presenting to the Society the portrait of Prof. Lesley, said:

At the same time that the portrait of Mr. Fraley was obtained it was learned that a portrait of Prof. J. P. Lesley was obtainable; the subscription fund was immediately enlarged and the second portrait was procured. I must not omit to add that both are the admirable work of the same excellent artist—Mrs. Margaret Lesley Bush Brown, a daughter of Prof. Lesley.

In behalf of the subscribers, I present both these portraits to the American Philosophical Society.

Mr. **William A. Ingham** said:

In speaking to the resolution accepting the donation of Prof. Lesley's portrait tendered this evening to the Society my words shall be few and I hope fit.

This portrait of Prof. Lesley by his daughter is to me a most speaking likeness. It shows him as I have seen him a hundred times sitting in his chair, roused up from a reverie by some remark, whether opposing his views or corroborating them (it made little difference), but rousing him up and starting him off, active and alert on an animated discourse which might last an hour.

I have seen him thus often, and I prefer to remember him thus, if it shall so happen, that in the course of nature he shall go before me to join the majority. I am not competent (who is?) to pronounce on his eminent qualities as a geologist and scientist.

Prof. Lesley was an assistant on the First Geological Survey of the State, and has written a history of that Survey, published in Volume A of the Reports of the Second Survey.

The First Survey was completed in 1858 by the publication of the

Final Report, but some years prior to that date the corps was disbanded and Prof. Lesley had turned his attention to other matters.

He was Secretary of the American Iron and Steel Association for six years, and during that time he published *The Iron Manufacturers' Guide* (1856), which is a complete list of the active furnaces in the United States and a very complete discussion of the iron ores.

Of course much of this is now obsolete, but at the time it was the first and only manual on the subject.

About the same time he published his *Manual of Coal.*

This little book, a model of its kind, contains, first, a description of the coals of Pennsylvania, remarkable for its accuracy, and, second, a concise treatise on "Surface Geology." In this the author insists on the importance of topography as an adjunct to geology.

Prof. Spencer, in a recent address (*Popular Science Monthly*, May, 1898), says, "Geomorphy is the outgrowth of topography, *which was made a science* fifty or sixty years ago by Prof. J. P. Lesley and his coworkers. Its birth is graphically described by the author himself."

And from the very beginning of the Second Geological Survey, Prof. Lesley has always insisted on the importance of topography as preliminary to geology. This is shown by the repeated efforts of the Board at his instigation to obtain an appropriation for a topographical survey. The failure of these efforts will account for the fact that the Second Geological Survey is not as satisfactory as it might have been made.

It seems strange at this date that any argument should be necessary in favor of topography as preliminary to geology.

After the disbandment of the First Survey, Prof. Lesley was constantly occupied as an expert geologist—which work took him all over our State and into adjoining States. He became thoroughly familiar with every square mile of the State geologically and geographically.

In this time he made frequent professional visits to Europe, where he made acquaintance with all eminent geologists, many of whom became his life-long friends.

In one of these visits he saw that the key to the complicated structure of the Jura was to be found in Pennsylvania, and Desor came over here and learned from us how to interpret the Jura problem.

This varied professional experience, as evinced in his reports to his employers (one of which, on the Nittany Valley ores, a model of geological work, has been published), but most of which are in the archives of his employers—his numerous publications in the PROCEEDINGS of our Society, his general repute as to familiarity with the geology of the State, combined to make him the choice for State Geologist under the act of 1874.

He was Librarian of this Society part of the time and Secretary all the time from 1858 to 1887.

He was Vice-President from 1887 to 1898.

My personal intercourse with Prof. Lesley began with the organization of the Second Geological Survey in 1874.

Since that time he as State Geologist and I as Secretary have been in the most intimate connection.

In that period of over twenty years I have been impressed with his unselfish motives, supervising the field work of his assistants with the sole idea, (1) of the good of the Survey, and (2) that every man should receive full credit for his work.

He is a thorough, unselfish, impartial man of science.

It is largely due to Prof. Lesley, in continuing across this State the work begun by Prof. Cook in New Jersey on the terminal glacial moraine, that the wonderful recent revival of interest in surface geology is due. The modern geology which attempts to account for the present condition of the earth's surface may almost be said to date from the survey of the terminal moraine.

Aside from geology, Prof. Lesley, in his Lowell lectures, delivered in 1865–1866, on the "Origin and Destiny of Man," branches far afield into Egyptology and Theology. In these subjects, which he merely touches, he shows the hand of a master.

A list, possibly imperfect, kindly prepared for me by Miss Morrison, is hereto appended of Prof. Lesley's contributions to our PROCEEDINGS. The titles number sixty-nine, on almost every subject conceivable. But besides these printed papers, he has often delighted the Society with impromptu remarks on matters pending. We all remember how brilliant these impromptu remarks were; how he illuminated what was obscure and explained what was confused. Sad to say, no record of these speeches has been preserved.

In the preparation of this brief and inadequate sketch, it has been my duty and pleasure to read again some of Prof. Lesley's publications, and I have been impressed more than ever with his amazing versatility, with the power of his imagination, illuminating every subject with flashes of genius, with his perfect command of language and his profound thought.

His introductory chapters to the Final Report of the Second Survey (a most unequal work, part of which was written under stress of physical and nervous depression), particularly the chapters on "Geological Time," "Geological Space" and "The Appalachian Sea," with his other works previously mentioned, deserve record here. These show that he is not a narrow-minded, one-sided person ; that his scope embraced the sphere of human knowledge, of course with limitations, as no man is omniscient. After all, his monument is to be found in the publications of the Second Geological Survey, 120 volumes, a library in itself.

It is our pride that he belongs to us. It is our pleasure that we have now a portrait of him which may serve to perpetuate his likeness to those who shall come after him, and who will reap, perhaps unwittingly, the harvest from seed which he has sown.

Communications Published in the TRANSACTIONS *and* PROCEEDINGS *of the American Philosophical Society, by Prof. J. P. Lesley.*

Notes on a Map intended to Illustrate Five Types of Earth Surface in United States between Connecticut and the Atlantic	Trans. [N.S.],	xiii,	307
Insensible Gradation of Words	Proc.	vii,	129
Geology of the Arctic Archipelago	"	"	293
Copper Horizon	"	"	329
Becker's Aneroid	"	"	342
Primary Limestone near Chadd's Ford, Pa	"	viii,	281
Superclinous Oil Springs of the West	"	"	262
Coal System of Southern Virginia	"	ix,	30
Aurora at Cape Breton	"	"	60
Coal Measures at Cape Breton	Proc.	ix,	93, 197
West Virginia Asphalt	Proc.	ix,	183
Vortical Gales at Sea, January, 1864	"	"	183
Abbeville Quarries	"	"	388
Ancient Sea Level	"	"	399
Pennsylvania Lignite	"	"	463
Petroleum in Eastern Kentucky	Proc.	x,	33, 187
Compounds of Bar	Proc.	x,	137
Petroleum Well Sections	"	"	227
D'Orbigny Papyrus	"	"	543
Harris Museum in Alexandria	"	"	561
Aurora of April 15, 1869	"	xi,	111
Section across the Alleghany Mountains	"	"	115
Tornado at Cave City, Ky	"	"	277
Violation of the Law of Debituminization	"	xii,	125

Titaniferous Iron-ore Belt	Proc. xii, 139
Upthrow Fault at Embreville Furnace, E. Tennessee	“ “ 444
Geology of Tazewell, etc., Counties of Virginia	“ “ 489
Record of Fourteen Oil Wells at Brady's Bend, Pa	“ “ 562
Iron Ores of the South Mountain	“ xiii, 3
Dunning's Creek Fossil Ore-bed	“ “ 156
Micrometer for Field-note Plotting	“ “ 233
Structure and Erosion of Brush Mountain	“ “ 503
Geology of Brown Hematite, Spruce Creek, Pa	“ “ 19
Note on Makaptos	“ xvii, 7
Magnesian Limestone Analysis	“ “ 260
Drift Phenomena of the United States	“ xviii, 85
Gas Well at Murrayville, Pa	“ “ 207
Brazilian Geography and Topography	“ “ 248
Ancient Buried River Channel Crossing the Allegheny River	“ “ 354
Etymology of Hpakans	“ “ 363
Obituary of John W. Harden	“ “ 422
Spirit of a Philosophical Society	“ “ 582
On the Landa Alphabet	“ xix, 153
On the Shells found by H. C. Lewis at Saltville	“ “ 155
Notes on Certain Models	“ “ 193
On Professor White's Notes	“ “ 202
Egyptian Element in the Names of Hebrew Kings	“ “ 409
Greco-Egyptian Etymology of Takyos	“ “ 110
Origin of the Great Lakes	“ xx, 95
Obituary of E. Desor	Proc. xx, 298, 519
Ice Erosion on the Blue Mountains	Proc. xx, 468
Progress of the Second Geological Survey of Penna	Proc. xx, 497, 537, 638
Egyptian Character of Hebrew Names	Proc. xx, 506
Policy of the Society	“ “ 645
Identity of the Terms Catskill and Ponent	“ “ 673
Obituary Notice of Dr. John L. LeConte	“ xxi, 291
Meaning of the “Set” Animal	Proc. xxi, 344, 455
Obituary Notice of James Macfarlane	“ xxiii, 287
On the Hebrew Word Sh Di (shaddai)	“ “ 303
Obituary Notice of F. V. Hayden	“ xxv, 59
On the Grapeville Gas Wells	“ xxix, 11
Notes on Hebrew Egyptian *Anx.* Enoch; Anoki; Enos	“ “ 17
On an Important Boring Through 2000 Feet of Trias in Eastern Pennsylvania	“ “ 20
Obituary Notice of P. W. Sheafer	“ “ 38
Artesian Wells in Montgomery County, at Norristown, Washington Square, Worcester Township, Flourtown, Williams Station, King of Prussia; Parkesburg, Chester County; Radnor, Delaware County, and Philadelphia, by Oscar C. S. Carter and J. P. Lesley	“ “ 43

The resolution of acceptance of the portraits was then unanimously adopted.

Dr. Frazer presented the report of the Officers and Council.

The Secretaries announced the death, on May 19, 1898, of the Rt. Hon. William Ewart Gladstone, at Hawarden, Chester, England.

Pending nominations Nos. 1432 and 1451 to 1468 were read and spoken to, and new nomination No. 1409 was read.

A paper by Dr. William C. Day, entitled, "The Production of an Asphalt Resembling Gilsonite by the Distillation of a Mixture of Fish and Wood," was read.

The Secretaries reported the election of the following as members:

Edward F. DeLancey, of New York.
Prof. William Harkness, of Washington.
Prof. C. P. Tiele, Ph.D., of Leyden.
Alfred H. Allen, F.C.S., of Sheffield, Eng.
Boverton Redwood, F.R.S., of London.
Prof. Albert B. Prescott, LL.D., of Ann Arbor.
Prof. William H. Pettee, of Ann Arbor.
Prof. R. P. Whitfield, of New York.
H. LaBarre Jayne, of Philadelphia.
Lamar Gray Patterson, of Cumberland, Md.
Charles Platt, of Philadelphia.
John H. Converse, of Philadelphia.
Henry Grier Bryant, F.R.G.S., Lond., of Philadelphia.
Emlen Hutchinson, of Philadelphia.
Prof. G. Mangarini, Ph.D., of Rome.

The meeting was then adjourned by the presiding officer.

THE PRODUCTION OF AN ASPHALT RESEMBLING GILSONITE BY THE DISTILLATION OF A MIXTURE OF FISH AND WOOD.

(Plate X.)

BY WM. C. DAY.

(Read May 20, 1898.)

A few years since, I undertook a rather detailed experimental study of the variety of asphalt known as gilsonite,[1] which is mined for commercial use in Utah. Gilsonite is a black, glistening, brittle material, yielding a dark-brown powder when finely pulverized. It fuses readily, becoming a liquid which begins to boil at a temperture above the limit of a mercury thermometer.

It is entirely soluble in carbon bisulphide, not entirely soluble in ordinary ether, partly soluble in absolute alcohol, petroleum ether, glacial acetic acid and chloroform, imparting to these solvents a yellowish to red color with green fluorescence. Besides carbon and hydrogen, it contains sulphur, nitrogen, a trace of oxygen and one-tenth of one per cent. of ash.

Among the various products which I obtained by distilling gilsonite may be mentioned as of interest in this connection certain nitrogenous bases extracted from the distillates by the action of dilute acid and precipitated therefrom by alkalies. These bodies have an odor like that of the pyridine and quinoline series. Such substances were first obtained from bitumen by Prof. S. F. Peckham, who noticed them in distillates from California petroleum; later by myself from an asphalt occurring in Coos county, Oreg., also in the product which forms the subject of this paper.

As a result of considerable experimental work in the past few years with asphalts from a variety of sources in the United States, together with a study of the literature pertaining to the question of the origin of the bitumens from both the geological and the chemical standpoints, I became impressed with the belief that the solid and also some of the higher boiling liquid bitumens have been formed in the earth by the distillation of mixed animal and vegetable material, together with steam at high temperatures, but at pressures which may or may not have been high. Petroleum distillates have been obtained by Warren and later by Engler from fish oil, and still more recently by Sadtler from linseed oil. In addition to liquid distillates, paraffin has also been obtained by these investigators. No mention, however, of an analogous production of asphalts, so far as I am aware, has ever been made.

---

[1] *Journal Franklin Institute*, Vol. clx, p. 221.

To test the correctness of the belief already expressed, I tried the following experiments:

Into a cylindrical iron retort were introduced a number of fresh herring, a quantity of pine saw dust and a number of small pieces of fat pine wood. The retort was connected by plaster-of-Paris joints with a short glass tube, and this with a gas pipe four feet long, the latter being placed in an ordinary combustion furnace, the other end of the pipe was connected with a Liebig's-cold-water condenser.[1] After charging and closing the retort, it was heated by means of gas stoves, which together with the retort were surrounded with loose bricks to prevent the loss of heat. The heating of the retort was regulated by the rapidity with which vapors were evolved, an increase of heat being necessary toward the end of the distillation. The gas pipe was simultaneously heated to bright redness by the combustion furnace. The pressure was that of the atmosphere. During the progress of the distillation water and oil together with a white smoke flowed from the condenser into the receiver. The oil obtained was lighter than water, of bad odor and very dark red in color. At the end of the gas pipe next to the retort carbon separated, and on one occasion nearly choked the pipe. Only once was an oil heavier than water obtained, and this was small in amount.

The condensed oil was separated from the water on which it floated, and finally completely dried over chloride of calcium.

It was then placed in a distilling bulb provided with thermometer and distilled, using a straight glass tube as an air condenser.

Boiling began at about 100 Centigrade, but the mercury soon rose to 120. The distillate between these limits consisted of a lemon-yellow mobile oil together with a few drops of water.

At 120 C. the receiver was changed, and another fraction darker in color and less mobile was obtained while the mercury rose to 180. The third fraction was collected between the limits 180 and 245; the fourth between 245 and 315, this fraction showing a pronounced greenish fluorescence, the color by transmitted light being

---

[1] See accompanying photograph.

PROCEEDINGS AM. PHILOS. SOC. VOL. XXXVII, No. 157 PLATE X.

dark red. At 340 the receiver was again changed, the thermometer removed and the distillation continued until the temperature was (at a guess) about 425 Centigrade. At this point the distilling bulb cracked and the operation was stopped. On cooling, the contents of the bulb became a black brittle solid, showing a very pronounced resemblance to gilsonite in every way. The following are its properties: Black glistening color, becoming brown on pulverizing, and slightly darker than gilsonite; fracture conchoidal, entirely soluble in carbon bisulphide; ether dissolves 90.6 per cent.; alcohol 66.3 per cent.; petroleum ether 61.1 per cent. All these solutions show greenish fluorescence, while the color by transmitted light varies from yellow to reddish.

As already stated, the distilling bulb cracked before I had decided to stop the distillation, and the solid product being slightly sticky to the touch, I distilled a second portion of oil, collecting the same fractions as before, but continuing the heating longer. This time I obtained a solid so like gilsonite that it was difficult to tell which was which. A combustion of the first sample gave carbon, 87.5 per cent., and hydrogen, 7.7 per cent. A combustion of the second sample gave carbon, 88.9 per cent., and hydrogen, 6.7 per cent. The figures for Utah gilsonite are 88.3 for carbon and 9.9 for hydrogen. At the time (three years since) I made the analysis of gilsonite nitrogen was not determined. Recently I have determined the nitrogen, and found it to be 1.96 per cent. Since the carbon, hydrogen and sulphur figures added up to 99.5 one or all of the three must have been high, and I am inclined to think that it was the hydrogen, since I cannot now be sure that the gilsonite sample was entirely dry.

The agreement in properties and composition between the gilsonite and my product is much more perfect than it would have been reasonable to expect at the outset of the experiment, particularly when it is remembered that both are doubtless mixtures in themselves, and that certainly on distillation they yield highly complicated mixtures of hydrocarbons.

As the product under discussion was obtained only a few days ago, I have not had time to carry the investigation further, but enough has been done to show how a solid asphaltum may have been formed in nature and to afford a rather satisfactory demonstration of the correctness of views entertained by a number of scientists who have formed their opinions largely on geological evidence and the study of natural occurrences.

It should be stated, in addition, that for the sake of comparison, fish alone, *i. e.*, without wood, were subjected to distillation and without passing the vapors through the red-hot tube. The products obtained included nothing that bore any resemblance to gilsonite and they were radically different from the products which accompanied the distillation of fish and wood together.

This brief paper is of course only preliminary to one which should consider the literature of the subject more in detail, and which may, I trust, throw some light on a few of the many problems which naturally suggest themselves.

I shall continue the work as rapidly as my limited time and facilities for such study will permit. In conclusion I take pleasure in expressing my obligations to my assistant, Mr. Eugene Leamy, for his very intelligent and effective aid in carrying on the experimental work.

SWARTHMORE COLLEGE, May 19, 1898.

Henry M. Phillips Prize Essay.

PHILADELPHIA, 104 SOUTH FIFTH STREET,
APRIL 5, 1897.

THE AMERICAN PHILOSOPHICAL SOCIETY, held at Philadelphia, for Promoting Useful Knowledge has the honor to announce that an award of the Henry M. Phillips Prize will be made during the year 1899; essays for the same to be in the possession of the Society before the first day of May, 1899. The subject upon which essays are to be furnished by competitors is:

The development of the law, as illustrated by the decisions relating to the police power of the State.

The essay shall not contain more than one hundred thousand words, excluding notes. Such notes, if any, should be kept separate as an Appendix.

The Prize for the crowned essay will be two thousand dollars lawful gold coin of the United States, to be paid as soon as may be after the award. The Society invites attention to the regulations governing said prize, which accompany this circular.

William V. McKean, Craig Biddle, Mayer Sulzberger, C. Stuart Patterson, Joseph C. Fraley, Frederick Fraley, *President of the Society*, Horace Jayne, M. D.,* *Treasurer of the Society*, *Committee on the Henry M. Phillips Prize Essay Fund.*

The essays must be sent, addressed to Frederick Fraley, President of the American Philosophical Society, Philadelphia.

* Elected Treasurer American Philosophical Society, January 7, 1898, in place of J. Sergeant Price, Esq., deceased, August 16, 1897.

REGULATIONS.

Competitors for the prize shall affix to their essays some motto or name (not the proper name of the author, however), and when the essay is forwarded to the Society it shall be accompanied by a sealed envelope, containing within the proper name of the author, and, on the outside thereof, the motto or name adopted for the essay.

At a stated meeting of the Society, in pursuance of the advertisement, all essays received up to that time shall be referred to a Committee of Judges, to consist of five persons, who shall be selected by the Society from nomination of ten persons made by the Standing Committee on the Henry M. Phillips Prize Essay Fund.

Essays may be written in English, French, German, Dutch, Italian, Spanish or Latin, but, if in any language except English, must be accompanied by an English translation of the same.

No treatise or essay shall be entitled to compete for the prize that has been already published or printed, or for which the author has received already any prize, profit, or honor of any nature whatsoever.

All essays must be *clearly* and *legibly* written or printed on one side of the paper only.

The literary property of such essays shall be in their authors, subject to the right of the Society to publish the crowned essay in its Transactions or Proceedings.

PROCEEDINGS

OF THE

AMERICAN PHILOSOPHICAL SOCIETY

HELD AT PHILADELPHIA FOR PROMOTING USEFUL KNOWLEDGE.

VOL. XXXVII. DECEMBER, 1898. No. 158.

Stated Meeting, October 7, 1898.

Vice-President SELLERS in the Chair.

Present, 28 members.

Dr. Caspar Réné Gregory and Messrs. Hutchinson, Bryant and H. La Barre Jayne, newly elected members, were presented to the Chair, and took their seats in the Society.

Acknowledgments of election to membership were read from Messrs. H. La Barre Jayne, Emlen Hutchinson, John H. Converse, Charles Platt, William Harkness, R. P. Whitfield, Henry G. Bryant, Lamar Gray Patterson, William Henry Pettee, Edward F. DeLancey, C. P. Tiele, Albert B. Prescott, Alfred H. Allen, Boverton Redwood, Guglielmo Mengarini and A. Donaldson Smith.

A letter was received from the Secretary of State, enclosing an invitation from the government of Italy to the Society to send delegates to the Twelfth International Congress of Orientalists, to be held at Rome on October 2, 1899; and on motion the President was authorized to appoint a delegate, in accordance with the invitation. Prof. H. V. Hilprecht was subsequently appointed the delegate of the Society.

An invitation was received from the Academy of Sciences and other learned societies of Stockholm, to send a delegate to a commemorative fête to be held at Stockholm on October 7, 1898, on the occasion of the fiftieth anniversary of the death of Berzelius. The Secretary was directed to express to these societies the regret of the American Philosophical Society, that the coincidence of the date of reception of the invitation with that of the fête prevented the Society from sending a delegate, as it otherwise would have felt honored in doing.

From the von Mueller Monument Fund.

From the Franklin Institute of Pennsylvania, expressing its sympathy with the Society in the loss sustained by the death of its Vice-President, Dr. William Pepper.

The Librarian announced a number of donations to the Library, for which thanks were ordered to be sent to the donors.

Dr. Morris presented a Hawaiian newspaper sent by Prof. Boyé, which contained a notice of the hoisting of the American flag.

Dr. Morris read an obituary notice of Prof. Henry D. Gregory.

Announcement was made of the decease of the following members:

Dr. Friedrich Müller, of Vienna, on May 25, 1898, aged 64 years; elected to membership December 17, 1886.

Dr. William Pepper, of Philadelphia, on July 29, 1898, aged 55 years; elected to membership July 15, 1870.

Dr. James Hall, of Albany, on August 8, 1898, aged 87 years; elected to membership July 21, 1854.

Dr. George M. Ebers, of Tutzing, near Munich, on August 8, 1898, aged 61 years; elected to membership May 17, 1895.

Prof. Henry Trimble, at St. David's, Pa., on August 24, 1898, aged 45 years; elected to membership, February 19, 1897.

Dr. Francis Pulzsky, of Buda Pesth, on September 9, 1897, aged 82 years; elected to membership, May 21, 1886.

Hon. Thomas F. Bayard, of Wilmington, Del., on September 28, 1898, aged 69 years; elected to membership October 15, 1897.

Dr. Frazer offered the following resolutions, in regard to the death of Dr. Pepper:

Resolved, That a Committee of five members be appointed by the President to arrange for a memorial meeting in reference to the death of Dr. William Pepper, with authority to confer with the Committee appointed by the Trustees of the University of Pennsylvania, and the representatives of other institutions and societies with which he was connected.

Resolved, That as a mark of respect to the memory of Dr. William Pepper, a Vice-President of this Society, the office which he filled remain vacant until the annual election on January 6 next.

Adopted.

Dr. Frazer, Dr. DaCosta, Mr. Edmunds, General Wistar and Dr. Tyson were subsequently appointed members of this Committee.

On motion the President was requested to appoint a member to prepare a biographical notice of the late Prof. Henry Trimble. Prof. Sadtler was subsequently so appointed.

Dr. Caspar Réné Gregory made a communication on "Greek Manuscripts in Europe, in the East, and in America."

Dr. Daniel G. Brinton read a paper on "The Linguistic Cartography of the Chaco Region."

Prof. Smyth read a paper on "The Apollonius Saga and Shakespeare's Pericles Prince of Tyre."

A paper was presented by Dr. G. A. Miller and read by title, "On the Quaternion Group."

Pending nominations Nos. 1432, 1464, 1469, and new nominations Nos. 1470 to 1472 were read.

Dr. Morris, as Curator, offered a correction of the printed record of the meeting of April 1, 1898, PROCEEDINGS, p. 83, as follows: In the sentence in which "Dr. Hays asked 'Is this [a framed copy presented at that time] the *facsimile* copy which Dr. Morris took out of the Librarian's desk last autumn, etc.?'" "Dr. Morris replied that it was." Dr. Morris claimed that this should read: ". . . . which had been taken out of the old desk used by Mr. Phillips," which was the form in which the question was put, and replied to in the affirmative by him. Dr. Hays expressed regret that any misunderstanding should have occurred as to what was said, but it was naturally accounted for by the fact that an old desk, which had been used by the late Mr. Phillips when Librarian, had been recently assigned to one of the members of the Society for the custody of his papers. Finding this *facsimile* of the copy of the Declaration of Independence in one of the drawers, he assumed that it should be handed to the Curators, to be deposited in the Cabinet, instead of to the Librarian. This difference of opinion as to the proper disposition of the paper had led to the original discussion of which a brief abstract was given in the minute referred to.

The rough minutes were then read, and the Society was adjourned by the presiding officer.

THE LINGUISTIC CARTOGRAPHY OF THE CHACO REGION.

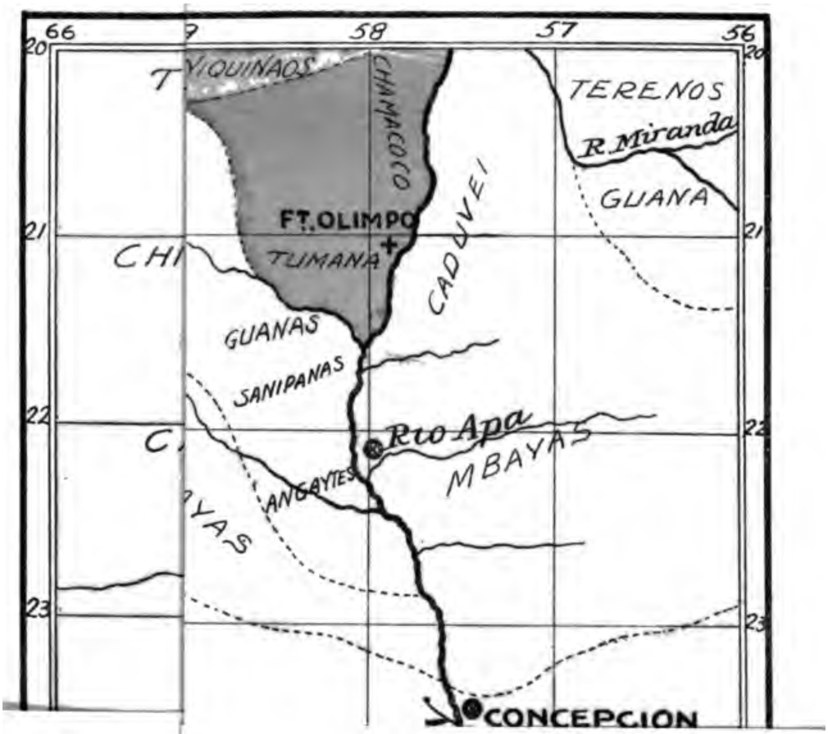
BY DANIEL G. BRINTON, M.D.

(Read October 7, 1898.)

CONTENTS.—Introductory—Recent Contributions to the Linguistics of theChaco—The Mataco Linguistic Stock—The Guaycuru Stock—The Tupi Stock—The Samucu Stock—The Ennima Stock—The Arawack Stock—The Quechua Stock—The Lule Stock—Groups of Uncertain Affinities—The Lenguas (Timbues)—The Chanas—The Charuas and Querandies—The Payaguas—The Cacanas and Calchiquis—Other Unidentified Tribes—Bibliographic Note—List of Ethnographic Maps.

INTRODUCTORY.

In mapping the areas of American aboriginal languages there is a vast region in South America which has been peculiarly perplexing, and in several respects so remains.


66
7
58
57
56
20
20
21
21
22
22
23
23
T
VIQUINAOS
CHAMACOCO
TERENOS
R. Miranda
GUANA
FT. OLIMPO
TUMANA
CADUVEI
CHI
GUANAS
SANIPANAS
Rio Apa
MBAYAS
C
ANGAYTES
YAS
CONCEPCION

the affirmative by him. Dr. Hays expressed regret that any misunderstanding should have occurred as to what was said, but it was naturally accounted for by the fact that an old desk, which had been used by the late Mr. Phillips when Librarian, had been recently assigned to one of the members of the Society for the custody of his papers. Finding this *facsimile* of the copy of the Declaration of Independence in one of the drawers, he assumed that it should be handed to the Curators, to be deposited in the Cabinet, instead of to the Librarian. This difference of opinion as to the proper disposition of the paper had led to the original discussion of which a brief abstract was given in the minute referred to.

The rough minutes were then read, and the Society was adjourned by the presiding officer.

THE LINGUISTIC CARTOGRAPHY OF THE CHACO REGION.

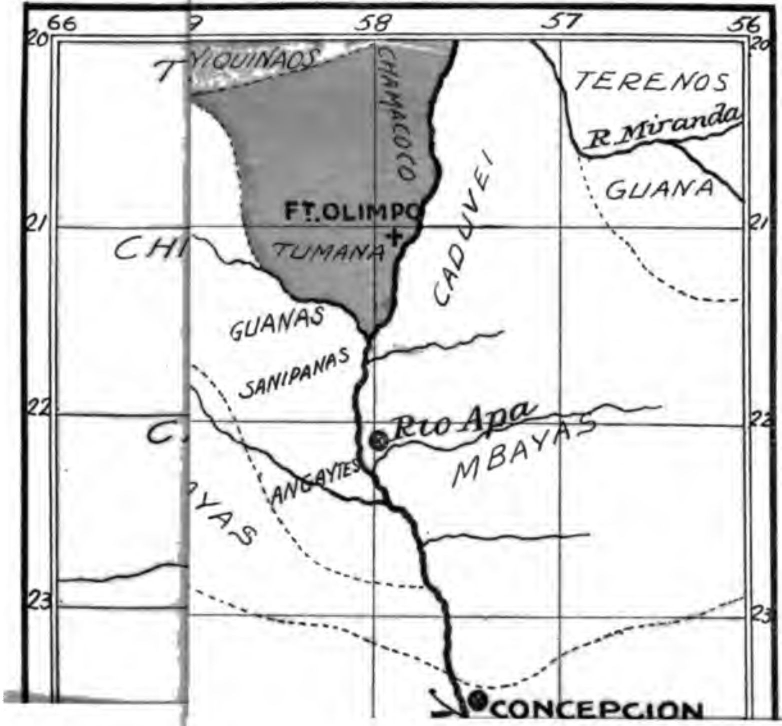
BY DANIEL G. BRINTON, M.D.

(Read October 7, 1898.)

CONTENTS.—Introductory—Recent Contributions to the Linguistics of theChaco—The Mataco Linguistic Stock—The Guaycuru Stock—The Tupi Stock—The Samucu Stock—The Ennima Stock—The Arawack Stock—The Quechua Stock—The Lule Stock—Groups of Uncertain Affinities—The Lenguas (Timbues)—The Chanas—The Charuas and Querandies—The Payaguas—The Cacanas and Calchiquis—Other Unidentified Tribes—Bibliographic Note—List of Ethnographic Maps.

INTRODUCTORY.

In mapping the areas of American aboriginal languages there is a vast region in South America which has been peculiarly perplexing, and in several respects so remains.


66
9
58
57
56
20
21
22
23
T
YIQUIÑAOS
CHAMACOCO
TERENOS
R. Miranda
GUANA
FT. OLIMPO
TUMANA
CADUVEI
CHI
GUANAS
SANIPANAS
C
Rio Apa
MBAYAS
ANGAYTES
YAS
CONCEPCION

This is that which is vaguely known as El Gran Chaco, or the Great Hunting Ground. It lies in northern Argentina and eastern Bolivia, between latitude 18° and 32° south, and longitude 58° and 66° west from Greenwich. It covers an area about as great in extent as from Pittsburg to the Mississippi and from Chicago to the Gulf of Mexico.[1]

On the east, the valley of the Rio Parana and Rio Paraguay, which are the extensions of the Rio de la Plata, and on the west the lofty elevations of the Andes, are its well-marked boundaries. Between them the surface is usually level and intersected by numerous streams, the three most important of which, the Pilcomayo, the Vermejo and the Salado, flow from the Andes southeastward in almost parallel lines.

The climate is hot and the vegetation tropical. During the rainy season the flat, grassy lands are transformed into shallow lakes, while near the watercourses rise dense and lofty forests. In the north are arid and sterile highlands.

Except by the water-ways it is almost impossible to traverse the country, and for that reason extensive tracts of it are still unexplored.

The native tribes who inhabited this region have always been in the lowest stages of culture, depending on hunting and fishing for their subsistence, without settled abodes, migratory and in ceaseless warfare with each other. The self-sacrificing efforts of the Jesuit and Franciscan missionaries have at times succeeded in gathering a few hundred together about some mission, only to be dispersed again on some slight cause. Thus, some years ago, in the middle of the night, the whole of the tribe of Penoquiquias, which had been converted and induced to take up a fixed abode, suddenly disappeared, and were never seen again (Cardus, i, p. 272).

RECENT CONTRIBUTIONS TO THE LINGUISTICS OF THE CHACO.

In my volume on the linguistic classification of the American race, published in 1891, I divided the tribes of the Chaco into four principal linguistic stocks, the Guaycuru, the Mataco, the Vilela and the Payagua.[1] Since then a number of contributions to the subject and several ethnographic maps of parts of the region have been furnished by J. B. Ambrosetti, J. de Brettes, Guido Boggiani, Dr. G. A. Colini, Giovanni Pelleschi, Samuel A. Lafone Quevedo, and others, and some unpublished manuscripts of early date have seen the light in print, the titles of which are given in the bibliographic note at the close of this paper. My present intention is to offer a summary of their results in the linguistic ethnography of the Chaco region, as depicted in the revised chart which I have prepared, and to present some suggestions for the correct classification of tribes of still uncertain affinities.

---

[1] Boggiani (i, p. 10) puts the maximum length of the Chaco at 830 geographical miles, and its greatest width at 360 miles.

For this and other references in the text see the Bibliographic Note at the close of this article.

The writer to whom we owe most is Mr. S. A. Lafone Quevedo. He has edited the manuscripts of Tavolini, Brigniel, Barcena and others, and contributed numerous articles of his own, and deserves the highest credit for his zeal and accuracy.

He entertains, however, certain linguistic theories which would with difficulty find general acceptance, and which expose some of his reasonings to serious question.

Thus, he maintains that there is a fundamental difference between what he calls the "Atlantic" type of languages and the "Pacific" or "Andean," based upon the trait that the latter suffix the pronominal particles while the former prefix them.

This, as a mere matter of placement, is of minor importance. For example, the Latin has the pronominal indications suffixed to the verbal root; but the neo-Latin tongues without exception prefix them. In America, the dialects of the Zoque-Mixe stock differ entirely among themselves in this respect, though closely allied in others.[2]

He himself acknowledges (x, p. 23) that the dialects of the Guaycuru stock are by no means a unit in this feature, some prefixing and others suffixing the pronominal particles.

His general classification is:

ANDEAN TYPE (SUFFIXES).	ATLANTIC TYPE (PREFIXES).
Araucanian,	Tupi-Guarani,
Aymara,	Mataco,
Quechua,	Guaycuru.
Lule,	
Vilela.	

---

[1] *The American Race. A Linguistic Classification and Ethnographic Description of the Native Tribes of North and South America*, pp. 392 (New York, 1891).

[2] Raoul de la Grasserie, *Langue Zoque et Langue Mixe*, Introduction (Paris, 1898).

Yet in some passages (xi, p. xliii) he dismisses the criterion of the affixes, and in maintaining the affinity of Quechua and Guaycuru says their contrast in this respect is unimportant!

I do not question the general value of pronominal pre-position and post-position; but it is not sufficiently fundamental to be adopted as a single criterion for classification.[1]

Another feature to which Mr. Lafone Quevedo has given close study is the permutation of sounds in these tongues. Undoubtedly he has here shown regular and frequent changes between the dialects. But there will be few to follow him in such an equation as:

co = *ho* = *hu* = *hy* = *y* (Tavolini, i, App., p. 26).

With such liberty, any two words could be brought into genetic relation.

This laxity of method naturally leads him to assert linguistic affinities between all stocks; these he claims the Guaycuru has with the Guarani, the Mataco with the Carib, and all with the Arawack (L. Q., ii, pp. 56, 58).

Such conclusions are regretable, and it were to be desired that students of American languages should be as cautious in asserting analogies as are the leading scholars in the Aryan and Semitic fields.

THE MATACO LINGUISTIC STOCK.

The linguistic study of the tribes of this vast area has had the usual effect of constantly reducing the number of its linguistic stocks by recognizing as dialects what earlier observers believed to be independent languages. To this result, I shall also contribute somewhat in the present article.

It has been long recognized that most of the Chaco region was occupied at the discovery by two great groups of related idioms.

One of these was central, extending in unbroken continuity from the river Paraguay to the foothills of the Andes, and from S. lat. 21° to 26°. This was the *Mataco* stock, so called from its central and principal tribe.[2] It is noticeable that all its members reside in contiguity, as if driven together by outer pressure on all sides. This would give probability to the opinion that they are the oldest surviving inhabitants of the Chaco.

---

[1] Prof. Friederich Müller observes that while there are a number of suffix-languages, there is, in fact, no example of a true prefix-language, "da neben ihr immer die Suffix-Bildung zur Anwendung kommt" (*Grundriss der Sprachwissenschaft*, Bd. i, p. 129). This illustrates how uncertain such a criterion must be. Prof. Hovelacque remarks that linguistically the position of the pronominal affix "n'a aucune importance" (*La Linguistique*, p. 174.)

[2] The Matacos refer to themselves as *vicquii* = *viri*, men.

The dialectic variations in the stock may be seen in the following comparisons:[1]

Mataco Dialects.

	MAN.	WOMAN.	SUN.	MOON.
Mataco,	*icnú,* *inoon,*	*tiquiecua,* *cisna,*	*huala,* *juala,*	*tsimini.* *huŧla.*
Vejoz,	*noon,*		*ijuala,*	*guŧla.*
Nocten,			*ijuela,*	*iguela.*

	FIRE.	WATER.	HEAD.	EYE.
Mataco,	*itaj,*	*inot,* *huaj,*	*etec,* *letec,*	*uotŧi,* *teijbŧi.*
Vejoz,	*itag,*	*guag,*	*litec,*	*notelo.*
Nocten,	*ittaj,*	*innat,*	*etek,*	*tesló.*

	EAR.	MOUTH.	NOSE.	TONGUE.
Mataco,	*choteĭ,*	*kaj,*	*nocness,* *nus,*	*nuea-jlo-jsiŧ,* *hajlechá.*
Vejoz,	*noguiotoc,*	*nolagni,*	*nonus,*	*nocagliguiu.*
Nocten,	*quiotŧ,*	*caj,*	*nus,*	*caj-liquio.*

	TOOTH.	HAND.	FOOT.	HOUSE.
Mataco,	*chotei,* *tzotei,*	*cuŧyi,* *noguez,*	*pacui,* *kolo,*	*huette,*
Vejoz,	*nochete,*	*noguei,*	*nopachio*	*hoet, lobuque.*
Nocten,	*zottŧ.*	*cueiquió.*	*piquió*	*gugue.*

The tribe called by de Brettes the *Aksseks* must be members of the Mataco stock. They dwelt on the Bolivian frontier, extending in a northwesterly direction from the Rio Pilcomayo to the confines of the Samucus.[2]

Lafone Quevedo is of the opinion that the Mataco is a jargon, owing its lexicon to one stock and its grammar to another (Pelleschi, ii, p. 14). This is not the impression that it makes upon me. I rather agree with Father Remedi (in Lafone Quevedo, v, p. 25) that it is of a very ancient type, and, apart from a certain number of borrowed words, is a wholly independent stock.

---

[1] I have selected the same words which form the brief comparative vocabularies in my *American Race.*

[2] Mallat de Bassilan, *L' Amérique Inconnue*, pp. 11, 37. They spoke neither Guana (Ennima), Guarani or Chamacoco.

THE GUAYCURU STOCK.

The second stock has received the name *Guaycuru*, a Tupi word meaning "fast runners."[1] Mr. Lafone Quevedo does not acknowledge a fundamental distinction between this and the preceding group of tongues,[2] but the evidence seems to me insufficient to blend them in one.

They almost surrounded the Matacos on three sides, the south, east and north, and extended on the eastern bank of the river Paraguay as far as S. lat. 19° 30′ into the Brazilian province of Mato Grosso. In the south they roved as far as to 33° lat. south, where they were in contact with the Pampean tribes.

One of their most redoubtable members were the Tobas, called by the Spanish Frentones or Frontones, from their habit of shaving the forehead. In modern times they have occupied the shores of the lower Pilcomayo, and have been reported at various localities along its banks quite up to its rapids (Cardus, i; Thouar, i).[3] The Pilagas are a closely related horde.

The large majority of this stock lived west of the great river; but in the south the Abipones and Mepones were found in the last century east of the river about lat. 28°; and in the north all the left bank, from Fort Coimbra to Puerto Casado, was peopled by tribes of the Guaycuru stock, locally known as *Quetiadegodis* or *Uettiadiu*, and *Eyiguayegis* or *Eggiuágeg*, the modern Mbayas and Caduveos (Boggiani, iv, p. 171).

The dialectic variations in this stock may be seen in the subjoined table.

---

[1] Lafone Quevedo considers this word a diminutive from the root *ai*, rogue; but I think that von Martius is right in considering it composed of *atá* or *guatá*, to go; *curitei*, quickly; *uara*, men. Some writers have objected to the use of this collective name for the stock on the ground that it is a common noun, and does not apply to a single nation. The same objection would be applicable to many *nomina gentilia* in common use (*e. g.* Aryans, Semites) and is therefore a needless criticism. There are reasons why it is not desirable to choose the name of a single tribe for the whole stock.

[2] "El grupo Mataco es una subclase mas del gran grupo Guaycuru." (*Bol. Inst. Geog. Argentin*, 1894, p. 518.)

[3] M. Thouar (i, pp. 419–421) gives vocabularies of the Toba on the lower and on the upper Pilcomayo.

Guaycuru Dialects.

	MAN.	WOMAN.	SUN.	MOON.
Mocovi,	*iale,*	*ahlo,*	*daassoa,*	*ciraigu.*
Toba,	*yahale,*	*aló,*	*nala,*	*cagoic.*
Mbaya,	*conelego,*	*igualo,*	*aligeg,*	*epenahi.*
Abipon,	*yoale,*	*oanerma,*	*empaiga,*	*graoec.*
Caduveo,	*houlegre,*	*agouina,* *igualo,*	*aligega,*	*epenai.*
Quiniquinas,	*heleóde,*	*helóde,*	*allighera,*	*hepenai.*
Upper Tobas,	*kome,*	*noodik,* *yayuoó,*	*nala,*	*auguei.*

	FIRE.	WATER.	HEAD.	EYE.
Mocovi,	*annoreh, olé,*	*evagayaca,*	*y-caigo,*	*cocté, cijaté.*
Toba,	*nodek,*	*nogop,* *netagrgat,*	*calcoic,*	*cahayté,*
Mbaya,	*nuledi,*	*niogo,*	*nakilo,*	*cogecogo.*
Abipon,	*ncaa-tec,*	*enarp, enope,*	*nemag,*	*natoéte.*
Caduveo,	*nuledi,*	*niogo,*	*naguilo,*	*nigecoge.*
Quiniquinas,	*noledi,*	*niogo,*	*hiaquilo,*	*kekerehe.*
Upper Tobas,	*lolle,*	*nogapp.*		

	EAR.	MOUTH.	NOSE.	TONGUE.
Mocovi,	*licquela,*	*ayap, lape,*	*immik,*	*ulleganaste.*
Toba,	*quetela,*	*ayap,*	*cadimic,*	*lateagat.*
Mbaya,	*conapagoti,*	*iola,*	*nimigo,*	*cadoketi.*
Abipon,	*quetal,*	*aagat,*	*catanat,*	*lachigat.*
Caduveo,	*napagate,*	*joladi,*	*nimigo,* *codeimic,*	*nogueligi,* *codocaiti.*
Quiniquinas,	*parăhte,*	*hin-iolăque,*	*himigo,*	*hiokelégui .*

	TOOTH.	HAND.	FOOT.	HOUSE.
Mocovi,	*hve, be,*	*népu-qjuinet,*	*leti,*	*labu, vo.*
Toba,	*jové,*	*yubat,*	*apiate, ippja,*	*nohic.*
Mbaya,	*codoe, nogue,*	*cobahaga,*	*codohua,*	*dimi.*
Abipon,	*yavé,*	*apaquena,*	*nachayu,*	*nüc.*
Caduveo,	*nogue,*	*nilagadi,*	*codohona,*	*dimigi.*
Quiniquinas,	*codohé,*	*hiedede,*	*hibyhade,*	*cudeine.*

THE TUPI STOCK.

The northern portion of my map, from longitude 58° 30′ to 66° is occupied by the Chiriguanos. They are a well-defined substock of the great Tupi-Guarani family. In the Sierra they extend south to the head waters of the Rio Vermejo (Cardus, i, p. 242). About

8000 of them have been converted to Christianity by the missionaries, one of whom, Father A. M. Corrado, published some years since a book of devotion in the tongue.[1]

The difference of its vocables from the foregoing is seen in the following examples:

Man, *aba.*
Woman, *cuña.*
Sun, *cuarasi.*
Moon, *yasi, yuai.*
Fire, *tata.*
Water, *i.*
Head, *ñaca.*
Eye, *exa.*
Ear, *inanvi.*
Nose, *iñapongua.*
Hand, *ypó.*
Foot, *ypul.*
House, *oga.*

The name Chiriguanos is supposed to be a term of contempt applied to them by the Quechuas (= *estiércol frio*). They call themselves *Aba,* "men."

One of their branches, the Tapiis or Tapietes, extend as far south as the Pilcomayo, and in scattered bands nearly to the R. Paraguay (Cardus, i, p. 269). Their name is given them as a term of contempt by the Chiriguanos, because they go quite naked. It signifies the male or female genitalia (Tupi, *tapï*).[2] For the same reason they are called *Tirumbae,* "naked men." M. Thouar found their westernmost village at Yagaigua, longitude 65° (Thouar, i, p. 305). They wear the *tembeta,* and are friendly (*id.*, p. 333).

The Guarañocas, one of their branches, inhabit the "Chaco de Antonio," within the territory of Bolivia.[3] The Yanaiguas, the Palmares and the Sirionas (on the Rio Peray) are other branches (Cardus, i, p. 272).

At the time of the discovery this stock occupied much of the east of the map, extending along the left bank of the Rio Paraguay from about latitude 23° to 30° and below.[4] Here they bore the names Cainguas and Guayanas, up the river, and Caracaraes and

---

[1] *Catecismo de la Doctrina Cristiana en Lengua Chiriguana* (Sucre, 1871). A short grammatical outline of the dialect is given in the work *El Colegio Franciscano de Tarija y sus Misiones*, pp. 523–526.

[2] It is also applied to the Chaneses of the foothills (Cardus, i, p. 250). Another derivation of it is from *tapiii,* something bought,— a slave. *Tarija y sus Misiones,* p. 54.

[3] F. de Oliveira Cesar, *Viaje al Oriente de Bolivia,* p. 77 (Buenos Aires, 1891).

[4] Dr. Paul Ehrenreich, "Ethnographische Karte von Brasilien," in Petermann's *Mittheilungen,* 1891.

Ubeguas, near its mouth.[1] Whether the *Caaiguas* of Charlevoix are the same as the Cainguas is uncertain. Dr. Ehrenreich supposes them the older representatives of the modern *Guayakis*, a tribe near the middle Parana, who are extremely wild and timid. We have no sufficient knowledge of their tongue to identify the stock to which they belong.[2]

The modern Cainguas live on the upper Parana. Their customs and dialects have been thoroughly studied by Ambrosetti, who gives an ample and accurate vocabulary (Ambrosetti, ii and iii). The assertion of some writers that they have a tongue peculiar to themselves has not proved correct. They are divided into three subtribes.

Apuiteré.
Baaberá, or *Baticolas.*
Chiripa.

There are, however, but unimportant differences in the dialects.

THE SAMUCU STOCK.

In the northeast corner of the map, longitude 58°, latitude 20°, on the right bank of the river Paraguay, dwell the Chamocos or Chiamococos. They have been especially studied by Boggiani, whose monograph upon them presents excellent ethnographic and linguistic material.

He claimed them (i, p. 23) to be an independent stock, and denied (*id.*, p. 19) that they are linguistically related to the Samucus or Zamucos described by Father Azara and the traveler D'Orbigny.

Dr. Karl von den Steinen, in whose hands is a MS. grammar of the Samucu, has shown, however, by a comparison of twenty words that there is a decided lexical similarity between the two, and that this also extends to grammatic forms.[3]

---

[1] See D'Orbigny, *L'Homme Américain*, Tom. ii, p. 270, whose statement has not been impugned by subsequent writers.

[2] Dr. Ehrenreich, on the strength of one or two words, inclines to the opinion that they are Ges (my Tapuyas). See his article in *Globus*, January, 1898, p. 73.

[3] His article is published in *Globus*, for May, 1895 (Bd. lxxvii, No. 21). In the *American Race*, p. 301, I have given twelve subtribes of the Samucu stock and a short vocabulary. Cardus (i, p. 327) calls it "Zamuca," and prints a vocabulary of twenty-three words.

Comparison of Chamococo and Samucu.

	CHAMOCOCO.	SAMUCU.
I,	*eióc,*	*yoc* (we).
Thou,	*óua,*	*ugua.*
Good,	*ompa,*	*uom.*
White,	*porlo,*	*pororo.*
Sweet,	*diri,*	*dirip.*
Dead,	*toi,*	*toi.*
Wood,	*pid,*	*pit.*
Tree,	*pori,*	*pore.*
Road,	*dĕc,*	*daec.*
Water,	*nió,*	*yot.*
Sun,	*dĕi,*	*dirie* (day).
Mother,	*ota,*	*ote.*
Man,	*nĕit,*	*naitie.*
Tongue,	*os-aruc,*	*archo* (pl.).
Hand,	*os-umme,*	*yumanai.*
Eye,	*os-iddi,*	*yede.*
Foot,	*os-iddili,*	*irie.*
No, not,	*iĕ,*	*ca-.*
Our,	*os-,*	*az-.*
One,	*sommala,*	*tschomara.*

This comparison can leave no doubt that the verbal correspondences of the two tongues are due to a close affinity of some kind. It has been accepted by Sr. Boggiani himself (iv, p. 169). Whether this is genetic must be left for decision until Dr. Von den Steinen publishes the grammar in his possession.

Another lexical similarity which neither he nor Boggiani has noted is that to the Arawack. To illustrate this I have drawn up the following comparisons, in which the words following the numeral 1 are from the Chiamoco-Sumucu, and those following the 2 are from the Arawack dialects named. The resemblances speak for themselves.

Comparison of Samucu and Arawack.

MAN.

1. Cham., *neit;* Sam., *naitie, nani, vairigue.*
2. Ar., *iti* (father), *ira-it* (husband); Guana, *hapo-itai* (man).

SUN.

1. Cham., *dei;* Sam., *dirie, yede.*
2. Ar., *háddali, hadali.*

MOON.

1. Cham., *sciagurugu.*
2. Ande., *cashiri ;* Goajiro, *kashi ;* Manao; *ghairy.*

FIRE.

1. Cham., *örugu ;* Sam., *pioc.*
2. Moxos., *yucu ;* Baure, *hioke.*

WATER.

1. Cham., *nio ;* Sam., *yot.*
2. Antis., *nia ;* Baure., *hina.*

HEAD.

1. Cham., *achu ;* Sam., *yatodo.*
2. Ande., *ito, buto ;* Uainuma, *ba-ita ;* Layana, *tode.*

EAR.

1. Cham., *a-ánri, a-anu ;* Sam., *yagorone.*
2. Guana, *guai-haino.*

EYE.

1. Cham., *iddi, illi ;* Sam., *yede, yedoi.*
2. Baniva, *iti ;* Barre, *iti ;* Mariate, *nu-doi ;* Parisi, *nu-duro.*

MOUTH.

1. Cham., *aáho ;* Sam., *yago-rone.*
2. Guana, *baho ;* Moxo., *nu-jaca ;* Atorai, *otaghu.*

TONGUE.

1. Cham., *arue ;* Sam., *archo* (pl.).
2. Maipure, *áre.*

TOOTH.

1. Cham., *a-potachaè.*
2. Uainuma, *áhăĭ, aei ;* Ande., *ai ;* Passe, *èe ;* Guana, *onhai.*

HAND.

1. Cham., *ummè ;* Sam., *imanaetio.*
2. Chontaquero, *huamianuta ;* Guana, *uon-húm ;* Layana, *memen ;* Peris., *uemeyonota.*

FOOT.

1. Cham., *idili ;* Sam., *irie.*
2. Ande., *guito ;* Arawak, *ukútti ;* Jabaana, *iti.*

HAIR.

1. Cham., *cachieha.*
2. Ande., *itçhi, eçhi ;* Araicu, Manao, *itschy ;* Baure, *ichi.*

TO SLEEP.

1. Cham., *tüghemo.*
2. Moxo., Baure, *ni-moco ;* Ande., *maye.*

The personal and possessive pronouns in the Chiamococo are as follows:

I,	*eio'c.*	Mine,	*a*	(inseparable prefix).
Thou,	*o'ua.*	Thine,	*e*	"
He,	*os* (?).	His,	*o*	"

The syllable *os* is prefixed to parts of the human body, articles of use and to verbs which are reflexive or intransitive. Boggiani considers it a generic pronoun referring to human beings. It seems akin to the numeral for "two," *ossia,* and therefore I should think it signifies "the other's," or "another's," which is the primary sense of the binary numeral.

The above pronouns are not those of the Arawack stock, except that the Ande uses the pronominal prefix *a* in the first person plural, which Adam thinks is an abbreviation of *aba.*[1]

The signs of negation in Chiamococo *giu'a, gio';* or the prefix *iê, iêt.* This differs entirely from the Arawack stock, where the negative is conveyed by the prefix *ma-, mo-,* with great uniformity.

These and other grammatical differences are too formidable to admit the opinion that the Samucu is a substock of the Arawack; while the lexical similarities are too numerous and striking to be overlooked. Very many words from Arawack dialects have been incorporated into the tongue spoken by the Chiamococos and their affined hordes.

The *Chamococos bravos,* who occasionally appear on the shores of the Rio Paraguay a few leagues south of Fort Olimpo, speak the same tongue, and their separation from the main stock is still remembered in tradition (Boggiani, iv, p. 170).

The proper name of the united tribe appears to be *Tumanahá* or *Timinaha,* which recurs in documents of the eighteenth century (Boggiani, *id.*); although this may be a modification of the not uncommon Tupi tribal term, *temymynó,* grandson or descendant, often used in a conventional, metaphorical sense.[2]

Father Fernandez, whose observations were made at the commencement of the last century, says that the Samucu tongue was spoken by the Morotocos, the Careras of the Reduccion de San Juan Bautista, the Ugoroños to the south and the Coroinos, a branch of the Morotocos.[1] Muratori adds that it was one of the three native languages officially taught in the Paraguay missions.[2]

---

[1] Lucien Adam, *Arte de la Lengua de los Indios Antis ó Campas,* p. 8 (Paris, 1890).

[2] Cf. Martius, *Ethnographie und Sprachenkunde,* Bd. ii, p. 172.

THE ENNIMA STOCK.

Since the publication of my *American Race*, a new linguistic stock has been discovered in the Chaco region. The first vocabulary of it was published by M. de Brettes, in 1892, containing about 130 words collected in 1887.[3] In the same year a posthumous work by Señor Juan de Cominges was printed in Buenos Aires, containing a list collected in 1879; and in 1895, Señor Guido Boggiani published in Rome a careful collection of terms he had formed in 1889, republishing the vocabulary of Cominges, but apparently not being aware of that of de Brettes.[4] This last differs notably from the others, introducing various Samucu and Guaycuru terms, but well representing the groundwork of the tongue.

The name first given to this stock was Guaná. This is a common noun in the Tupi-Guarani language, a term of respect, something equivalent to "fine" or "learned people;"[5] and was applied by them to various nations whose cultural condition impressed them favorably. Later Sr. Boggiani has proposed the more acceptable term Ennimá, a designation applied to them by their neighbors to the north and which may as well be adopted.[6]

The location of the stock is on the right bank of the Paraguay, 21° 30′ to 23° and westward nearly to the Bolivian line. Boggiani includes in it the tribes known as Guanas, Sanapanas, Sapuquis, Angaites and "Lenguas." To these must be added the Machicuys and the Chaco tribes mentioned by de Brettes as speaking "Guaná," the Néenssemakas, the Kamananghas and the Banghis.

Hervas located the Machicuys on a branch of the Rio Pilcomayo in the centre of the Chaco. They numbered about 1200 warriors and were divided into nineteen subtribes. Their language was consonantal, nasal and guttural. The names of the subtribes were of formidable length, as:

---

[1] *Relacion historial de los Indios Chiquitos*, pp. 316, 371, 394.

[2] *Il Cristianesimo felice nel Paraguay*, p. 132. The others were that of the "Guananis" (Guarani) and of the Chiquitos.

[3] Mallat de Bassilan, *L'Amèrique Inconnue*, Appendix.

[4] *Reale Academia dei Lincei*, Roma, 1895.

[5] "Edles Volk," "die Gelehrten," Martius, *Ethnog. und Sprachenkunde*, Bd. ii, pp. 172, 788. An abbreviation of *Guayána*.

[6] See Boggiani, "Etnografia del alto Paraguay," in *Boletin del Instituto Geografico Argentino*, 1898, p. 11.

Guiabamaelmayesma.
Guiguailyeguaypon.
Ycteaguayenene.
Sanguotaiyamoctoc.

They were characterized by wearing the *barbote* or labret, and were tall and warlike.

About 1862, Demersay found them few in number, located at the Quartel del Cerrito, five leagues from Asuncion, and obtained from them the vocabulary mentioned below.[1]

Father Azara asserted that the Machicuys spoke a tongue of their own; but D'Orbigny insisted that they were closely related to the Tobas, and hence belonged in the Guaycuru stock. He observes: "The termination in their tongue of *ith*, *ac* and *op* prove this beyond contradiction."[2]

M. Demersay, in his *Histoire du Paraguay* (1860), gives a short vocabulary of the "Machicuy" as follows:

1. Eyes, *hartec*.
2. Feet, *hemenec*.
3. Fingers, *heptehec*.
4. Thigh, *hehikohoc*.
5. Tobacco, *hequena*.
6. Fire, *tahasla*.
7. Yes, *tahase*.

Lafone Quevedo remarks of this (Tavolini, i, App., p. 19) that he has found no affinities in these words to the Abipon except in one (No. 3).

A comparison even of these few terms indicates, however, that they are not from the Guaycuru stock, but belong with the Ennima, as:

	MACHICUY.	GUANA.
Eyes,	*h-artec*,	*gni-actec*.
Feet,	*hemenec*,	*hemmenec*.
Fingers,	*he-ptehec*,	*pehec*.
Tobacco,	*he-quena*,	*henna*, *tenna*.
Fire,	*tahasla*,	*tata*.

Another proof is the terminal *c* (*ec*, *oc*), which is doubtless a pronominal suffix, and which appears also in one of the tribal names of the Machicuy given by Hervas. This relationship has been accepted by Boggiani (v).

---

[1] *Le Tour du Monde*, Vol. iv, pp. 108, 111.

[2] *L'Homme Américain*, Tome ii, p. 94.

No connection of this with any other tongue has yet been shown. There are a few similarities to the Tsoneca of Patagonia, but not sufficient to establish a relationship.[1]

	ENNIMA.	TSONECA.
Eye,	*gn-ia-te!ic,*	*ia-telk, iateteke.*
Beard,	*lekpae,*	*ia-pelek.*
Mouth,	*m-booc,*	*ia-pōlk.*
Great, large,	*sossepek,*	*sātsa.*
House,	*pahat,*	*ahoike.*
Bird,	*tōu,*	*tsōge.*
Extremity, member,	*pehec,*	*pgit.*
Man,	*kihvaouo,*	*kina.*

The word *pehec* or *pe'ec* seems a general term in both tongues for the leg and foot.

THE ARAWACK STOCK.

One of the various hordes called *Guanás* dwells north of Corumba, in the province of Mato Grasso. They are also spoken of as *Chualas*, which is merely a variant, and *Layanas*, another variant. The Terenos on the river Miranda are their neighbors and relatives. These belong to the Arawack stock, which extended its various branches in an unbroken line from the Bahama Islands, off the coast of Florida, nearly to the river Pilcomayo of the Chaco.

The relationship of this remote southern branch to the main stem is illustrated in the following comparisons:

Arawack Stock.

	MAN.	WOMAN.	SUN.	MOON.
Guana,	*hapohitai,* *ta hanan,*	*zeeno,*	*kat-hai,*	*kohaivai.*
Layana,	*hapohite,*	*zehena,*	*kai-xe,*	*cohehe.*
Arawack dialects,	*ati, atchi,*	*eno, ina,*	*cachi, katchi,*	*cohé.*

	FIRE.	WATER.	HEAD.	EYE.
Guana,	*incu,*	*huna,*	*kombai poi,*	*onguei.*
Layana,		*tohna,*	*tode,*	*ongheh.*
Arawack dialects,	*yucú.*	*une, tuna,*	*hida, ito.*	*nu-uqui.*

---

[1] The Tsoneca words are from H. Hale, *Ethnography and Philology of the U. S. Exploring Expedition.*

	EAR.	MOUTH.	NOSE.	TONGUE.
Guana,	*guaihaino,*	*baho,*	*agueiri,*	*mahainai.*
Layana,	*ghehena,*	*báhălo,*	*ghire,*	*nehne.*
Arawack dialects,	*guawui,*	*panoma,*	*nu-chiri,*	*nene, nino.*

	TOOTH.	HAND.	FOOT.	HOUSE.
Guana,	*onhai,*	*uonhum,*	*djàhavai,*	*maihaino.*
Layana,	*onhê,*	*memen,*	*djehêne,*	*nichena.*
Arawack dialects,	*nu-oe, n-ai,*	*no-noma,*	*un-geopa,*	*nupeno.*

THE QUECHUA STOCK.

In the southwestern portion of the map is marked the area at one time included under the government of the Incas. Their authority extended eastward to the Rio Salado, including the valley of Catamarca, and as far north as the upper tributaries of the Rio Vermejo, where they were in contact with the Chiriguanos.

This is a greater area for the Incasic power in this region than has generally been assigned it; but I am convinced that the evidence is sufficient to justify it.

I include among the Quechuas the tribe of Omaguas or Omaguacas who occupied an extended territory about Jujuy. Dr. Waitz, for various reasons, not linguistic, believed that they were a branch of the Tupi-Guarani stock, and related to the Chiriguanos.[1]

My grounds for dissenting from this and placing them with the Quechuas are the following:

1. The name *Omagua* is undoubtedly the Quechua, *umayaccha,* from *uma,* head, and *yachay,* to know, understand, and means, "intelligent, superior people."[2] It was applied by the Quechuas to various tribes whose culture or ability they respected.

2. Acarete du Biscay, who was among them in 1658, records that they called their chiefs *curaca,* which is the Quechua term for the head of a clan or village.[3]

3. Nicholas del Techo gives the personal name of one of their principal chiefs as "Piltipico." This is certainly the Quechua

---

[1] *Anthropologie der Naturvölker,* Bd. iii, pp. 432, 433.

[2] See von Tschudi, *Beiträge zur Kenntniss des Alten Peru,* p. 139. Martius thought it a hybrid of Quechua and Tupi. *Ethnographie und Sprachenkunde Amerikas,* Bd. i, S. 436.

[3] *Voyage to Buenos Aires,* p. 58 (London, 1716). At that time their principal town had 200 houses. Their immediate neighbors to the west were the Chichas, who were Quechuas.

ppillccopichiu, which signifies a certain mountain bird highly esteemed for its beautiful plumage.[1]

These facts leave no reasonable doubt that this tribe was of the Quechuan stock.

The Juris (Quechua, *suri*, ostrich[2]) had their habitations in the foothills about S. latitude 27° ("near the sierra of Anconquija," Lafone Quevedo). They are classed by D'Orbigny and Waitz among the Guaranis, but Lafone Quevedo believes they spoke a dialect of the Chaco. I included them (*American Race*, p. 316) among the Lule-Vilelas, from their location, but believe that it is somewhat probable that they belonged to the Quechua stock.

THE LULE STOCK.

In my former classification of the Chaco tongues I placed the Lule (of Machoni) and the Vilela under one group.[3] This has in a measure been substantiated by Lafone Quevedo, though he believes the latter to be more of a jargon (*mezcla*) of a number of tongues.[4]

This is, indeed, probable, as from their wandering habits Pelleschi calls them "the Jews of the Chaco." For this reason some have included them with the Matacos. There are lexical analogies, but the pronouns and the method of affixing them differ, the Vilela suffixing the possessive.

For the present, it seems necessary to leave them together and separate from others. But the *Tonocotes* whom I grouped with them are no doubt Matacos, the term being a corruption of *Noctenes* or *Octeneei*, modifications of their own name *Huenneyei*, "Men" (Thouar, i, p. 56).

GROUPS OF UNCERTAIN AFFINITIES.

The above-mentioned eight stocks are clearly recognized, there being sufficient linguistic material to distinguish and classify them.

---

[1] *Historia Provinciæ Paraquariæ*, Lib. ii, cap. 7.

[2] *Suri* was also the general name given by the Quechuas to the Province of Tucuman; so it would have no ethnic significance applied to a tribe.

[3] *The American Race*, p. 316.

[4] "Se ha podido establecer el hecho que (la Vilela) tiene bastante afinidad con el Lule de Machoni" (ii, p. 40). On the Lules of Barcena see under *Cacanas*. Elsewhere Lafone Quevedo says, "*Vilela, ó Chulupi ò Chunupi* es un co-dialecto del Lule de Machoni" (*Boletin del Inst. Geog. Argent.*, 1894, p. 520).

But there remain a number of tribes about whom there are much confusion and uncertainty. In some instances the same name has been applied to groups speaking radically distinct languages, and the identity of the name has led authors to suppose them of one origin. I shall mention some of the more prominent examples and attempt to diminish the difficulties which they present.

THE LENGUAS (TIMBUES).

Few tribes have contributed more to the confusion of the ethnography of the Chaco region than those known as the *Lenguas*. Dr. Colini (i, pp. 291, 292) inserts a long note upon them, but it fails to clear up the obscurity about them, or to reconcile the contradictory statements of authors.

These contradictions are materially lessened when we learn that the Spanish term *lengua*, tongue, was applied indiscriminately by the early colonists to any tribe who had the custom of inserting a labret, *barbote*, in the lower lip, causing it to project and resemble an outstretched tongue.[1] It has, therefore, no signification as a proper name.

In the Tupi-Guarani tongue this ornament is called *tembeta*, from *tembe*, the lower lip.[2] This explains the name applied to various tribes, Timbues, or Timbois. It is in signification the same as Lengua, and refers to the same use of the labret ornament.[3]

Neither Lengua nor Timbue, therefore, is a *nomen gentile*. This is evident from the discrepancies of authors about their locations and amply explains those discrepancies.

Father Azara describes them as a subtribe of the Abipons, and in entire conformity with this D'Orbigny[4] found them in 1828 living about latitude 27°, longitude 62°, in the midst of the territory of that tribe. He thought their language differed "quant au fond," but apparently did not examine it closely, and considered them of the same stock. This means simply that some of the Abipons wore the labret.

---

[1] A good illustration of its use is shown in the portrait of a Suya in Von den Steinen's *Durch Central Brasilien*, p. 204. Another form is where a labret several inches in length was thrust outward and downward through the lower lip.

[2] Ruiz de Montoya, *Vocabulario de la Lengua Tupi*, s. v.

[3] Not to the perforation of the nose, the *nariz horadada*, as Lafone Quevedo states (ix, p. 4). The *tembeta* is the sign of virility and probably a personal and totemic sign of life. When a warrior is killed in battle his slayer carries off the *tembeta* from his lip and presents it to his own wife (Thouar, i, p. 51). It is made of wood or metal, and varies in diameter.

[4] D'Orbigny, *L'Homme Américain*, Vol. ii, pp. 116, 120, 121.

Another tribe of Lenguas lived and still live on the right bank of the river Paraguay, about latitude 21°. They wear the labret, and have been recently visited by several travelers. Some of these speak a Guaycuru dialect, according to Boggiani and Colini, though Cardus reports authority that some are Guaranis. Possibly two tribes residing in the same region, though of diverse stocks, may wear the tembeta.

Further down stream, in the angle of the R. Paraguay and R. Pilcomayo near Asuncion, is another group of Lenguas. Mr. Lafone Quevedo states that they belong to the Mataco (Enimaga) stock; and this is confirmed by their numerals quoted by Father Cardus, as the following comparison illustrates:

	LENGUAS OF CARDUS.	MATACO.
One,	*gezle,*	*guoslo.*
Two,	*tigague,*	*ho-tequachi.*
Three,	*diaquegzlna,*	*lach-tdiquajel.*
Four,	*dipegai,*	*tdiqualesshichi.*
Five,	*chumaja,*	*ype befagla.*

The *Lenguas* whom M. Demersay found in this locality (1860) lived north of the Rio Pilcomayo, near the Quartel del Cerrito, and were fast disappearing.[1]

Under the Tupi appellative, Timbues, tribes wearing the labret were reported by Pedro Mendoza on the Paraguay about where the Mataco Lenguas were later found, and doubtless were the same.[2]

Others were on the lower Parana in early times (located latitude 33°, longitude 62° by Lafone Quevedo, ix, pp. 9–11 and 35). Their language is unknown, and they are long since extinct in that locality.

The same name, Timbois, Tembetas, always for the same reason, was applied to a tribe in the northern Chaco, speaking either Tupi or Chiquito (Lafone Quevedo, ix, p. 11), and to a band of the Chiriguanos (Cardus, i, p. 242).

---

[1] *Le Tour du Monde*, Tome iv, p. 108.

[2] Coleti, *Diccionario Storico-geografico dell' America Meridionale*, s. v. (Venice, 1771).

Some of the Chiquitos were certainly called Lenguas. Father Fernandez mentions a tribe so named, speaking Chiquito, who dwelt near Lake Nengetures, thirty leagues from the Rio Piray.[1]

A horde of the "Payaguas" (about latitude 27°, longitude 58°) seems also to have received the name Lenguas; as a "Lengua" vocabulary collected by Cerviño has been shown by Lafone Quevedo to be really Payagua, that is, Guaycuru (Tavolini i, App., p. 21). Doubtless they, too, made use of the labret, (see also Lafone Quevedo, xi, p. xxix).

From the above it is evident that neither of the names "Lenguas" or "Timbues" has any ethnic significance and they cause confusion; so I have omitted them from the map.[2] Believing the so-called Lenguas between the Pilcomayo and the Paraguay to be or to have been Matacos, I extend that stock to the latter river, differing in this from the map of Pelleschi.

THE CHANAS (CHANASES).

This is another general term which has led to ethnographic errors. It is a Tupi word compounded of *anê*, blood relation, with the pronominal prefix, *che*, my, = my relations.

Cardus, on his map, has correctly placed one of the tribes so named about latitude 22°, longitude 65°, south of the Chiriguanos, to whom they are affined, both being of Tupi blood.

D'Orbigny located an early nation of this name "on the island of the Uruguay, opposite the mouth of the Rio Negro."[3]

Lafone Quevedo has recently devoted an article to the latter horde (ix). He places them on the mainland, latitude 34°, longitude 59°. He also offers some interesting specimens of their language from the MSS. of Father Larrañaga. It appears to be morphologically related to the eastern Chaco tongues, but the information about it is too slight to be decisive. It shows clearly, however, that these "Chanas" were *not* relations of the Tupis.

Other Chaneses are located by Thouar on his map of the R. Pilcomayo, on that river about longitude 64°, latitude 22′ 30°.

---

[1] *Relacion historial*, p. 158.

[2] "Orejones," "Big-Eared," is another descriptive term applied by the Spaniards to any tribe who expanded the lobes of the ears by artificial means. It also has no ethnic significance.

[3] *L'Homme Américain*, Tome, ii, p. 84.

These must have been a band of the Chiriguanos who have recently wandered there.

The Ara-chanes (*uara-che-ana*, "men our cousins"), located by early writers on the Paraguay about south latitude 30°–31°, were obviously a Guarani horde. Ameghino quotes authorities to show that there were "reductions" of Chanas who were pure Guaranis on the Rio Carcarañal and the Rio Arecife.[1]

In spite of the identity in appearance and language of the Chaneses among the Chiriguanos, there is a tradition that they are of a different stock, all their adults having been slain and the children adopted by the Chiriguanos. For this reason the latter call them *tapiii*, slaves, while the Chaneses addresses a Chiriguano as *cheya*, "my master."[2]

THE CHARUAS AND QUERANDIES.

Acarete du Biscay, writing in 1658, says, "The country on the north side of the river de la Plata is inhabited by none but savages called *Charruas*."[3]

A wild, nomadic, equestrian nation of this name roamed over the same territory a century later and are described by Father Gaetano Cattaneo as intractable to the best efforts of the missionaries.[4]

Finally, about 1832, they were destroyed, as a tribe, by the whites, though probably individuals of them survived the assaults.

They appear to have extended north as far as 30° and to have occupied most of the area of Uruguay and parts of the Brazilian province of Rio Grande do Sul.

The linguistic affiliation of this extended people has not been discovered.

They are believed by Lafone Quevedo to have belonged to the Guaycuru stock,[5] but their name, which is Guarani (*che*, my,

---

[1] F. Ameghino, *La Antiguedad del Hombre en el Plata*, Tome i, Cap. viii. Other evidence is in the "Repartimiento," of 1582, published by Outes; op. cit. App. 3; but I do not signify this distribution of the Guaranis, as it seems to have been effected by the Spaniards.

[2] *El Colegio Franciscano de Tarija y sus Misiones*, p. 54 (Queracchi, 1884).

[3] *Voyage to Buenos Aires*, p. 28.

[4] His letters are appended to Muratori's *Il Cristianesimo Felice nel Paraguai* (Venice, 1743).

[5] In *Boletin del Instituto Geografico Argentino*, 1894, p. 524.

uara, men), may indicate that they were of that tongue.[1] They wore a peculiar labret. Following D'Orbigny and others, I placed them in *The American Race* as a separate stock; but now doubt that this was correct. No authentic texts of their language is known to me, but the elements of their culture, the place names of their area, and the local appellations of plants and animals are derived from the Tupi Guarani.[2]

In a monograph recently published, Señor Felix F. Outes has urgently argued that Charuas of the left bank of the La Plata and the Querandies (Carandies) of the right bank (near where the city of Buenos Aires is now situated) both belonged to the Guaycuru stock.[3] The latter extended as far north as the Rio Carcaraña (south latitude 32° 30′), where they adjoined the Quiloazas (Quilvazas). They wore the *tembeta,* and at the close of the sixteenth century were allied with the Guaranis, after which period their name disappears. Ameghino places them in the Guarani stock,[4] while Lafone Quevedo (ix) prefers to attach them to the Guaycurus.

The only linguistic evidence extant lies in the proper names which have been preserved. A notable peculiarity is the frequent termination of the names of chieftains in the syllable *pén;* thus *Cæspén, Pacaospén, Allapén, Quemumpén,* etc. This termination does not occur in the Guaycuru, but is not uncommon in the Aucanian (Araucanian) dialects, which also were spoken by the Pampean tribes. In these the word *pen* means estate or property. It is probably allied to *gen,* a suffix signifying rule, control or ownership.[5]

---

[1] Lafone Quevedo (ix, p. 12) prefers to derive it from *che,* my, or to me, and *haru,* hurtful, (*cherárua,* "lo que me hace daño," Ruiz), which would be applicable to enemies. He inclines to attach them to the Chaco stocks, although he quotes Hervas, who had a catechism in it, to the effect that their tongue was not related to the "idioms of the Paraguay."

[2] See Von Ihering, in *Verhandlungen der Berliner Anthrop. Gesell.,* 1889, pp. 655–659.

[3] *Los Querandies, Contribucion al Estudio de la Etnografia Argentina* (Buenos Aires, 1897).

[4] F. Ameghino, op. cit., Tom. i., Cap. xi.

[5] Comp. Febres, *Diccionario Araucano,* s.v., and Haverstadt, *Chilidugu,* Section 285. The latter gives the example, *inche-gen ovicha-gen.* "I am owner or master of these sheep." It is both a suffix and prefix. As a suffix, it often conveys the abstract sense of property or quality. Cf. Valdivia, *Arte y Gramatica de la lengua del Reyno de Chile,* pp. 41, 42.

Moreover, when in 1580 the Spaniards routed the Querandies, they fled not to the Guaycurus, but to the Ranqueles, whom they must have regarded as their kinsmen. The Ranqueles, however, are of Aucanian lineage and language.

I believe, therefore, that I was right in *The American Race* (p. 323) in placing the Querandies in the Aucanian stock, an opinion strengthened by the arguments of Burmeister from historic and archæologic grounds.[1]

THE PAYÀGUAS.

In my *American Race* I have counted this as one of the irreducible stocks of the Chaco, represented by the following tribes :

Agaces, on the Rio Paraguay.
Payaguas, near Santa Fé.
Sarigues, on middle Paraguay.[2]

Sr. Lafone Quevedo maintains that the Payagua is of the same stock as the Mocovi and Abipon, *i. e.*, the Guaycuru (xi, p. xliii). He bases this on a resemblance which he claims in the pronouns.

Von Martius denies that there was ever any specific tribe so called. The name, he thinks, is from the Tupi, *paracuâhygoata*, "a swimmer of the Paraguay."[3] But I believe it is simply the word given by Ruiz y Montoya, *paraguaiguara*, "the people of the Paraguay."[4]

That some so called did belong to the Guaycuru stem will be evident from a study of the following comparisons:

Comparison of the Payagua with the Guaycuru Dialects.

PAYAGUA.	GUAYCURU.
Beard, *hyakä, yaka.*	Moc., *y-acca* (my) ; Toba, *yacalaue.*
Bread, *asyà, yacia.*	From Moc., *asole*, maize.
Brother, *yagouà, yaguba.*	Toba, *yacaya* (my).
Child, *duanat.*	Mbaya, *niaani* (my).

---

[1] See his article in the *Verhandlungen* of the Berlin Anthropological Society, Bd. vii, p. 59.

[2] *The American Race*, p. 316.

[3] *Ethnographie und Sprachenkunde Amerikas*, Bd. ii, p. 225.

[4] *Vocabulario de la Lengua Guarani*, sub voce Paraguâ. On Arrowsmith's map (1810), the Payaguas are located on the left bank of the Rio Paraguay at the entrance of the Rio Pilcomayo; but I have found the locations of tribes on that map of small value.

PAYAGUA.	GUAYCURU.
Ear, *hyaheguada*, *yaigua*.	Cad., *na-pagate*.
Eye, *yatiqui*.	Abip., *yatoete*.
Face, *iguechógra*.	Abip., *y-agic*; Moc., *y-schih* (my), *cassigui* (thy).
Finger, *hychangà*, *igutsán*, *ygchan*.	Toba, *y-oganta*, *gohantá*.
Foot, *hyboro*, *seuó*, *bo*, *ybagro*.	Moc., *y-ppia* (my).
Girl, *luganára*.	Cad., *yónarā* (daughter).
Hand, *sumajyà*, *imajà*, *inagchiac*.	Toba, *emàch*, *emak* (left hand).
Head, *yamagra*.	Abipon, *yemag*, *nemag*.
Home, *yaggo*.	Abipon, *yecqui* (my); Cad., *nilagadi*.
Moon, *apajsa*.	Moc., *appé* (night): Cad., *aipainahi*.
Mother, *yoja-usa*.	Moc., *eyodo*.
Mouth, *hyachàldi*, *yajalqui*.	Cad., *joladi*.
Sun, *iscabala*.	Abip., *nalá*.
Thigh, *yejegà*, *yesiguè*.	
Water, *naaac*, *ueigh*, *guayaque*.	Moc., *uasayac*, *eva-gayacca*.
Women, *emjira*, *elommi*.	Moc., *aló* (female).

But this identification must not be applied to all the Payaguas. On various maps they will be found located along the great river anywhere from S. latitude 18° to 32°; and it is evident that tribes of widely different linguistic affiliations were called by this generic appellation.

For instance, in 1703, Father Neumann met the Payaguas on the river ahout forty leagues above Asuncion, and these spoke Guarani, as they called out to him:

"*Peĕ pĕmomba ore camarada Buenos Aires viarupi*" ("You were with those who destroyed our friends at Buenos Aires").

At that time they extended north as far as the Rio Tobati, where they adjoined the Sinamecas.[1]

THE CACANAS AND CALCHIQUIS.

Near the southwest corner of the map, I have placed within the Quechua territory, the Cacanas and Dieguitas. In *The American Race* (p. 320), I have included these under the hypothetical "Catamareña" linguistic stock.

We have the positive statement of the early missionary, Alonso de Barcena, that Calchaquis, Diaguitas and Cacanas, spoke the same tongue, and that it was quite different from its neighbors; but it has long been extinct and no specimen of it seems to have been preserved.

---

[1] P. Juan P. Fernandez, *Relacion Historial de los Indios Chiquitos*, pp. 154, 158 (Madrid, 1726).

At the time I wrote there was not a word positively identified as of this stock; and I must say the same now in spite of Lafone Quevedo's interesting essay (iii).

From various writers he collects the following as probably derived from the Cacana tongue:

-ā, or *-aa*, or *-ao*, village, a locative termination.
-aquin, ruler, chief.
caylle, a serpent-like tracing on copper, an amulet.
-co, termination meaning water, or watery.
-cocavi, pounded maize.
enja misajo, "bad head;" perhaps, *enjam*, head.
is, good, *aco*, not (Mataco, *isajia*, "not good").
gasta, village, a locative termination.
tu, fire, light.
vil, locative termination.
y, his, their, pronominal suffix.

Of these words, the frequent termination *gasta* I believe, in spite of the opinion of von Tschudi,[1] is the Quechua *llacta*, in a Spanish corruption; and *-ā*, or *ao*, resembles much the Quechuan locative termination *aui*. The word *cocavi*, cooked or prepared maize, reminds one of the Quechua *chucuca*, which means the same. The idol or tracing of a serpent, *caylle*, may well have been that of the old or big serpent, *machu kay*, of the Quechuas.[2]

Again, the title with which the Indians of Calchaqui saluted the impostor, Inca Pedro Chamijo, was, according to Lozano, *titaquin*, from which *aquin* in the above list is taken. But this is pure Quechua, as Holguin gives *chapaqquen* as "Señor de Indios."[3]

There is not sufficient evidence that this list offers any Cacana words, and the problem of the tongue is still unsolved, unless we agree, as I now incline, with the conclusion of Waitz,[1] that it was merely a corrupt dialect of the widely extended Quechua stock.

---

[1] Von Tschudi, in *Verhand. der Berliner Anthrop. Gesellschaft*, 1885, p. 184. A proof that it is from Quechua is that the same corruption is found in Chile, for instance, Antofagasta. I have discussed this question at some length in my *Studies in South American Native Languages*, pp. 54, 55 (Philadelphia, 1892).

[2] See Holguin, *Vocabulario de la Lengua Qquichua*, s. v. "Culebra" and "Serpiente." Ambrosetti also is inclined to regard this symbol as of Peruvian origin, representing the lightning snake and connected with the rains. See his article, "El Simbolo de la Serpiente en la Alfareria funeraria de la region Calchaqui," *Bol. Inst. Geog. Argentino*, 1896, pp. 219 *sq.*

[3] Elsewhere (xii, Sec. 12) Lafone Quevedo says, "Yo siempre he atribuido el mismo origen etnico-linguistico à los Cacanes, Lules de Barcena y Guaycuru-Abipones."

The evidence collected a third of a century ago by Vicente G. Quesada points strongly in this direction.[2] The Quechua was then still spoken in the valleys of Catamarca and around Santiago del Estero, Salta and Jujuy. Seven leagues from the city of Salta was still pointed out the "great walls of the Inca," the remains of the *Inca huasi*, "the house of the Inca," about which in 1658 Acarete du Biscay recorded the legend: "In the valley of Calchaqui was the house of the last Incas of Peru, which was called the White House; and there was a great deal of treasure there which the natives kept as a mark of their antient grandeur."[3]

While it is possible that at the Conquest some relics of an earlier tongue remained, that generally spoken was Quechua. This was said in so many words of the neighborhood of Cordova, in 1583, by the Licentiate Cepeda, "La gente de esta tierra hablan una lengua que llaman *Comechingona*, y otra *Zanavirona*, aunque los mas que sirven y entran y van hablando en la lengua general de Piru."[4]

OTHER UNIDENTIFIED TRIBES.

There remain a number of tribes mentioned as populous and important by the early writers, of some of whose idioms grammars and dictionaries were constructed, whom we cannot with certainty assign to the stocks I have mentioned.

Thus, Father del Techo in his list of the Chaco tribes as known in 1628, names the *Taimviæ*, who once occupied one hundred and eighty-eight villages; the *Teutæ*, and the *Agoiæ*.[5] We have no knowledge that the grammars of various of these tribes prepared by Father Gaspar Osorius (mentioned by Techo) have been preserved.[6]

---

[1] *Anthropologie der Naturvölker*, Bd. iv, p. 380.

[2] See his article, "Apuntes sobre el Origen de la lengua quichua en Santiago del Estero," printed in his volume, *Estudios Historicos*, Buenos Aires, 1863.

[3] Acarete du Biscay, *Voyage to Buenos Aires*, p. 54 (London, 1716).

[4] *Relaciones Geograficas de Indias*, Peru, Tom. ii, App., p. x (Madrid, 1885).

[5] *Historia Provinciæ Paraquariæ*, Lib. viii, Cap. 5.

[6] René-Moreno mentions in his *Biblioteca Boliviana*, p. 599, that at the beginning of this century there existed in the library of the Pueblo de San Ignacio, Province of Chiquito, an *Arte de la lengua Guaycuru*, one volume quarto, MS. Possibly this is one of the works referred to in the text.

But in this direction the most serious loss has been that of the works of Father Alphonso Barsena, although these were carefully copied in several examples by his disciple, Peter Agnascus. The classic passage describing these is the following:

"Alfonsus Barsena, insatiabili animarum Christo lucrandarum desiderio flagrans, communicatus cum Petro Agnasco studiis, Guaranicam, Naticam, Quisoquinam, Abiponicam, Quiranguicam, linguas didicit, vocabulariis, rudimentis, catechismis, et concionibus, ad earum usum compositis; cum tamen, antequam uterque e Tucumania discederent, Tonocotanam, Kakanam, Paquinam, Quirandicam, ad praecepta et lexica eo fine reduxissent, ut sociis in partem laborum venturis, facilitatem ad eas perdiscendas adferrent. Atque ut latius utilitas serperet, Petrus Agnascus pleraque, omnia ab Alfonso Barsena presertim composita, elegantissimo caractere pluries transcripsit, transcriptaque publici juris fecit."[1]

Of these, the Naticas, called also Mogonas, dwelt in 1790 on the upper Rio Vermejo;[2] the Abipone is familiar; the Tonocote I have already classified, but of the others we have no positive knowledge.

Bibliographic Note.

J. B. Ambrosetti:

- I. Vocabularies in Anales de la Sociedad Scientifica. Argentina, 1894.
- II. Los Indios Cainguá del Alto Parana, Boletin del Instituto Geograf. Argentin., 1895.
- III. Materiales para el Estudio de las Lenguas del Grupo Kanagaugue, Bol. de la Acad. Nac. en Cordoba. 1896.

P. Alonso Barcena:

- I. Arte y Vocabulario de la Lengua Toba. La Plata, 1893. (Edited by S. A. Lafone Quevedo.)

Guido Boggiani:

- I. I Ciamacoco. Roma, 1894.
- II. I Caduvei. Roma, 1895.
- III. Vocabulario dell' Idioma Guaná. Roma, 1895.
- IV. Los Indios Chamacocos, in Revista del Instituto Paraguayo, April, 1898.
- V. Etnografia del Alto Paraguay, Bol. Inst. Geog. Argent., 98.

Fr. Jose Cardus:

- I. Las Misiones Franciscanas entre los Infieles de Bolivia. Barcelona, 1886.

Dr. G. A. Colini:

- I. Notizie Storiche ed Etnografiche sopra i Guaycuru e gli Mbayá. Roma, 1895.

---

[1] Nicòlas del Techo, *ubi suprà*, Lib. ii, Cap. 43. Father Barsena died in 1597.

[2] D'Orbigny, *L'Homme Américain*, Tome ii, p. 11.

GIOVANNI PELLESCHI:

I. Otto Mesi nel Gran Ciacco. Florence, 1881.
II. Los Indios Matacos y su Lengua. Buenos Aires, 1897.

SAMUEL A. LAFONE QUEVEDO:

I. Vocabulario Toba. La Plata, 1893.
II. La Lengua Vilela ó Chulupé. Buenos Aires, 1895.
III. Tesoro de Catamarqueñismos. Buenos Aires, 1895.
IV. Idioma Abipon. Buenos Aires, 1896.
V. Los Indios Matacos y su Lengua. Buenos Aires, 1896.
VI. El Grupo Mataco-Mataguayo. Dialecto Nocten. Buenos Aires, 1896.
VII. El Grupo Mataco-Mataguayo. Dialecto Vejoz. Buenos Aires, 1896.
VIII. Idioma Mbaya. Buenos Aires, 1896.
IX. Los Indios Chanases y su Lengua. Buenos Aires, 1897.
X. Los Lules. Buenos Aires, 1894.
XI. Principios de Gramática Mocoví. La Plata, 1893.
XII. Las Migraciones de los Indios en la America Meridional. Buenos Aires, 1895.

P. FRANCISCO TAVOLINI:

I. Arte de la Lengua Mocoví. La Plata, 1892. Edited by S. A. Lafone Quevedo.

A. THOUAR:

I. Explorations dans l'Amérique du Sud. Paris, 1891.

LIST OF ETHNOGRAPHIC MAPS CONSULTED.

1. Carta del "Gran Ciaco," in Boggiani, i, p. 26.
2. Map of the Caduvei, in *id.* ii, p. 240.
3. Carte pour suivre le Voyage de M. A. Thouar, i.
4. Le Chaco Boreal in eod, i.
5. Mapa Etnico de las tribus Mataco-Mataguayos in Lafone Quevedo (vii).
6. Mapa Etnico del Rio de la Plata, in Lafone Quevedo (ix).
7. Mapa Historico Etnico de los Indios Abipones, in Lafone Quevedo iv.
8. Mapa Etnico de la Region Mataco-Mataguaya, in Pelleschi, ii.
9. Mapa de las Misiones Franciscanas y tribus Salvages en Bolivia, in Cardus, i.
10. Carta de Ilustracion de las Misiones del Colegio de Tarija, in *Tarija y Sus Misiones*, Quaracchi, 1881.
11. Mapa Etnico del Territorio Paraguayo-Brasiliano-Boliviano al Rio Paraguay desde el 19° hasta el 26°, in Boggiani, v.
12. J. H. de Brettes, Carte de Voyage, in Mallat de Bassilan, *L'Amérique Inconnue.* Paris, 1892.

THE MAP.

The accompanying map is intended to exhibit the areas and boundaries of the linguistic stocks of the Chaco region at the period of its latest permanent occupation by the native tribes. It is made up from various ethnographic authorities and from the recent maps the list of which is appended.

SHAKESPEARE'S PERICLES AND APOLLONIUS OF TYRE.

BY ALBERT H. SMYTH.

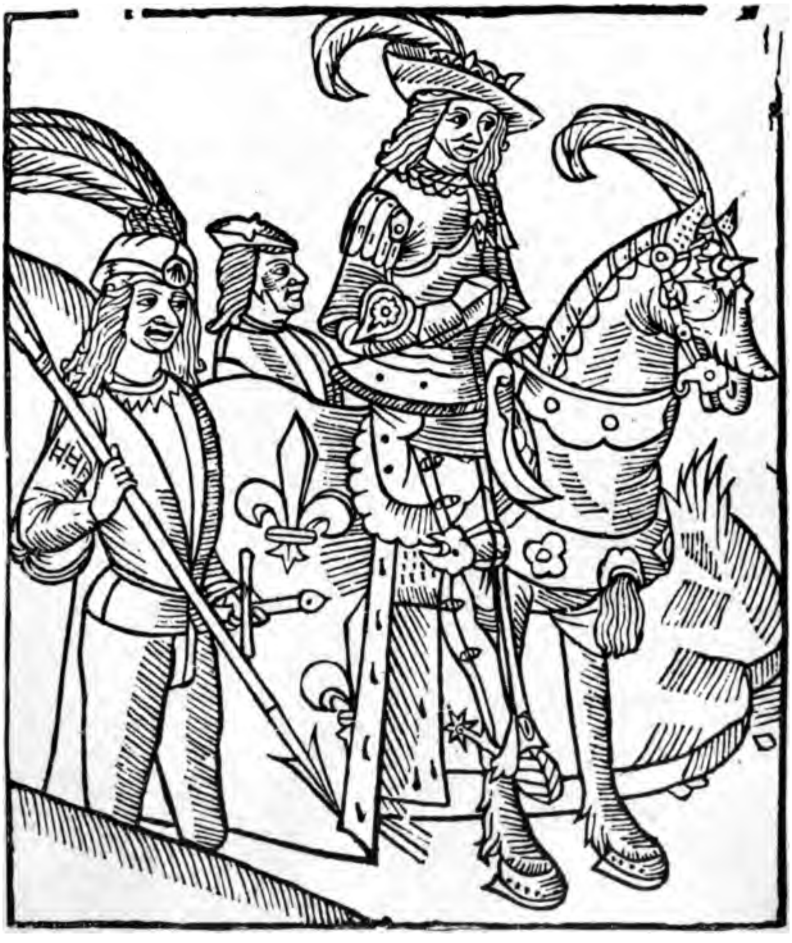
(*Read October 7, 1898.*)

Shakespeare's *Pericles Prince of Tyre* is the most singular example in Elizabethan literature of a consistent copying of a venerable and far-traveled story. The Apollonius Saga, from which it is wholly drawn, is known to nearly every language of Europe, and persists through more than a thousand years, flourishing in extraordinary popularity. Its undiminished vitality through many centuries and its almost unaltered integrity through many languages make it an attractive subject for critical exposition. From its untraced origin in the late sophistic romance of Greece it entered the literatures of Europe through a hundred manuscripts of an early Latin version. It was popular in Italy, Russia, Hungary, Bohemia, Norway and Iceland; it is found in a Danish ballad and a Netherland drama; it was sung by Provençal poets, and beyond the Pyrenees it was borrowed from to praise the Cid; it was translated in Crete into modern Greek in the sixteenth century; it was absorbed in France into the cycle of Charlemagne, and it is the only romance in Anglo-Saxon literature. The mythical Apollonius tossing on strange seas about the Mediterranean coasts became a veritable hero of history to the Germans, French and Italians, in the eleventh, twelfth and thirteenth centuries.

The long line of translations, imitations, *märchen*, *volksbücher*, *sagas*, romances, ballads and plays, ends at last in the culminating splendor of Shakespeare's *Pericles Prince of Tyre*.

The Anglo-Saxon romance, Gower's version in *Confessio Amantis*, and Shakespeare's drama have been studied with zeal and care; Al. Riese and M. Ring have edited the Latin text; Prof. Erwin Rohde, in *Der griechische Roman und seine Vorläufer*, and Teuffel-Schwabe, *Geschichte der römische Litteratur*, have partly traced the history of the saga; and S. Singer, *Apollonius von Tyrus, Untersuchungen über das Fortleben des antiken Romans in spätern Zeiten*, has compared the chief versions of the story. I have attempted in this new study to give a complete historical sketch of the romance, to compare its more important narratives with particular reference to

¶ Kynge Appolyn of Thyre.



FROM WYNKYN DE WORDE. 1510.

its final shape in Shakespeare, and to indicate its relations to the Vilkina saga, the poem of King Orendel, the *chanson* of Jourdain de Blaivies, the Solomon-Markolf cycle, and the *Antheia and Habrokomes* of Xenophon of Ephesus. For ten years I have followed the story through the libraries of Europe, collating MSS. and examining *incunabula* from Copenhagen to Constantinople. And I have observed with satisfaction in that time a growing sense of the importance of this saga in the history of literature. Various literary tasks have interfered with the completion and publication of my study, a delay which has not been without its advantages; for in consequence of it I have seen certain rare and important texts and codices edited and given to the world by far worthier hands than mine. A few years ago I edited the unique manuscript of the Anglo-Saxon *Apollonius* in the library of Corpus Christi College, Cambridge, and should have embodied it in this publication, but that my friend, Prof. Julius Zupitza, has happily forestalled me and edited the text[1] with erudition, judgment and skill that leave nothing to be desired.

The full text of the story, according to the version in the *Gesta Romanorum*, will be found printed in an Appendix to this paper, and to that the reader should refer as to an authoritative source. The story as it is found in *Historia Apollonii regis Tyri* (Alex. Riese, Lipsiæ, 1871; iterum recensuit, 1893) may be briefly summarized as follows:

THE STORY.

King Antiochus, the founder of Antioch, having one only daughter, fell in unnatural love with her; and that he might keep her for himself he made a law that whoso presumed to desire her in marriage and could not unfold the meaning of certain riddles which the king proposed should lose his life, and his head should be placed over the palace door as a warning. Among many other rich and powerful princes and lords who adventured came Apollonius of Tyre, who interpreted the riddle in which the king had artfully concealed, as he thought, his illicit love for his daughter. Terrified at his discovery, Apollonius returned secretly to Tyre, freighted a ship with necessaries, with wheat and with treasure, and in the night departed upon a sea-voyage. Antiochus dispatched a slave to Tyre with poison for the prince, only to learn from his messenger that Apollonius had fled. While he was thus sought for, Apollonius had arrived at Tarsus in Cilicia, where a citizen, Stranguillio, informed him of the famine that prevailed in the city. With his wheat he relieved the distress of the people, and out of gratitude they erected a bronze statue of him in the market-place. After a little while the vessel again put to sea, and, in a great tempest, was wrecked, and Apollonius alone, of all the ship's company, was cast ashore at Cyrene. An old fisherman who discovered him pitied his misfortune, clothed him with part of his own garments, and directed him to the city (Pentapolis of Cyrene). Upon his arrival there he found the youth of the land engaged in ball-play (ἐπὶσκυρος)[1] before Archistrates, the king. Apollonius took part in the game and won the king's approval and the prize of competition by his skill and strength. He was commanded to sit by the king at supper, and the king's daughter begged him to relate his adventures. Apollonius, having gone outside, put on a robe of state (*status*) and a crown[2] and taking a lyre went into the triclinium. Delighted with his playing, the princess besought the king that she might learn from the stranger, who, by permission of the king, became her teacher. One day the king was encountered in his walk by three young men (prince's sons) who declared their love for his daughter. Archistrates required each of them to write a letter setting forth his name, his parentage and his wealth, and sent the letters by the hand of Apollonius to the princess, who confessed the great love that had grown in her for Apollonius. With the royal consent they were married. After a time a vessel from Tyre put into port bringing the news that Antiochus and his daughter had been killed by a lightning stroke, and that Apollonius was heir to the city of Antioch, with all its riches, and the whole kingdom. With his consort he immediately set sail, with the best wishes of Archistrates for a prosperous journey. Hardly were they two days old at sea when a tempest arose, during which the princess was delivered of a daughter. The mother directly after appeared as one dead, whereupon the captain of the vessel came to Apollonius saying that the sailors would not permit the body to remain in the ship. A chest was made with much care, and the supposed corpse of the princess was laid within it, with treasure at the head and at the feet, and so committed to the deep. On the third day the chest was cast ashore on the coast of Ephesus, and was found by Cerimon, a physician, who, with his scholars, was walking upon the shore. When the chest was opened, and the body found and marveled at by all, it was observed by one of the scholars (Machaon) that some sparks of life yet lingered. He ordered a fire to be kindled, and chafed the body until the blood again began to flow freely and the lady to awaken from her trance. By her own request she was placed in the Temple of Diana at Ephesus, "for aye to be in shady cloister mewed."

---

[1] *Archiv für das Studium der neueren Sprachen und Litteraturen*, 1896.

---

[1] See Marquardt, *Römisches Altertum*, v, ii, 425.

[2] This robe, or long flowing gown—*statum lyricum*—appears to indicate the costume of the Citharists.

The sorrowful Apollonius came, by fortunate winds, to Tarsus, where he left his daughter and her nurse, Lycoris, in the care of Stranguillio and his wife, Dionysias, to be brought up with their daughter. And he swore an oath that he would not cut his hair, nor his beard, nor his nails until his daughter's marriage. He then departed into Egypt. The daughter, whose name was Tharsia, grew up in Tarsus, comely and well schooled. At fourteen years of age she learned from her dying nurse the names of her parents and the story of her birth in the tempest.

Dionysias, jealous of the child's beauty, and that she was so much in the heart of the people that her own child was altogether misprised, ordered her slave (Theophilus) to murder Tharsia, instructing him to wait by the tomb of Lycoris, whither it was the wont of Tharsia each day to repair and to pray, and there to seize and slay the child and to throw the body into the sea. The murderous intent was frustrated by the sudden appearance of some pirates, who carried Tharsia to their ships and departed with her. The slave returned to Dionysias and announced that the deed that she had ordered was done, whereupon the family put on mourning and a monument was erected by the people with this inscription "Unto the virgin Tharsia in lieu of her father's benefits, the citizens of Tarsus have erected this monument."[1]

The pirates landed at Mitylene and sold Tharsia to a brothel. In this loathsome place she still preserved her honor, drawing tears from those who sought her company by her moving recital of her painful adventures. Athenagoras, "the first in the city," visited her and was moved with compassion and pity.

---

[1] "D. M. Cives Tharsi Tharsiæ Virgini Beneficiis Tyrii Apollonii" (Codex Parasinus, 4955).

After fourteen years Apollonius returned to Tarsus only to learn that his daughter was dead, and after he had seen her monument he returned to his ship where he lay lonely and sad. Again driven by a tempest, the vessel chanced upon the coast of Mitylene, upon the birthday of Apollonius. Athenagoras walking toward the sea-shore saw Apollonius' tall ship riding at anchor and praised her stately appearance to the mariners, who invited him to come aboard and to partake of their feast. Upon inquiring after the owner of the ship, he learned that he was ill and weak with sorrow, that he had lost his wife upon the sea and his daughter in a strange land. Athenagoras offered two pieces of gold to the servant who would go down and tell his master that the Prince of the City desired him to come up out of darkness into light, but the servant replied that he could not buy new thighs with gold and that his master had said that whoever troubled him should have his thighs broken. Athenagoras then went in person, but in vain. Upon being told that the name of the master of the ship was Apollonius, he remembered that he had heard Tharsia call her father so. It occurred to him to send for Tharsia, whom he desired to comfort the lord of the vessel with her song. Apollonius wondered at her song, requited her with a hundred pieces of gold and bade her depart. Upon the demand of Athenagoras, she returned again to the despairing father and attempted to cheer him with riddles. Apollonius solved the riddles, but, vexed by her importunity, as it seemed to him, he rose up suddenly and struck her on the face so that she fell to the ground. Weeping, she lamented her unhappy fate, and at last Apollonius recognized his daughter.

The bawd who had purchased Tharsia was burned; the citizens of Mitylene erected two statues of brass in the market-place, "Unto Apollonius, prince of Tyrus, the preserver of our houses; and unto his virtuous daughter Tharsia;" and Tharsia was given as wife unto Athenagoras.

Upon his return to Tyre, in company with his daughter and son-in-law, Apollonius had a dream in which he was commanded of an angel to sail unto Ephesus and to go to the Temple of Diana and there with a loud voice to declare all his adventures. This he did, and was recognized by his wife, and the reunited family journeyed to Antioch, where Apollonius was crowned king. Thence he sailed to Tyre, where he found his kingdom governed in good order. He left his son-in-law as lieutenant at Tyre, and took ship for Tarsus, and denounced Stranguillio and Dionysias, who were thereupon stoned to death by the people, who would also have slain the slave Theophilus had not Tharsia interposed, and at whose intercession his life was spared. After three months the family departed for Cyrene, where they were received with great joy. The old king, Archistrates, died in the arms of his children; the fisherman who had befriended the naked Apollonius was richly rewarded, as was also Hellenicus, who had brought to him the news of the malice of Antiochus. So Apollonius reigned over Antioch, Tyre and Cyrene, and in happy union with his wife reached a great age. The history of his adventures he wrote in two volumes; one he sent to the Temple of Diana at Ephesus and the other he placed in his own library (Oxon. Magdal., 50).

The Origin of the Story.

It is clear that the narrative exhibits the familiar mannerism of the Greek sophistic romance. The circle of adventures in the Babylonian histories of Iamblichus, the Ethiopian histories of Heliodorus,[1] the Ephesian histories of Xenophon, the history of Leucippe and Klitophon, etc., is the same in all instances. The writers of this cycle had contrived a universal apparatus of romance upon which they drew liberally and upon equal terms—pirates, sea-storms, dreams, apparent death, reunited lovers, etc., were the materials out of which the romances were made.

No Greek original of the Apollonius story has been discovered, but it is hardly believable that no such original existed. Riese (*Historia Apollonii regis Tyri*), Rohde (*Der griechische Roman*), W. Christ (*Sitzungsberichte der München. Philol. Cl.*, 1872, S. 4), W. Teuffel (*Rh. Mus.*, xxvii, 104), W. Meyer ("Abhandlung über den lateinischen Text der Geschichte des Apollonius von Tyrus," in *Sitzungsberichte der philosophisch., philolog. u. historischen Classe d. König-Bayer. Akad. der Wissenschaften zu München*, 1872, Heft i, S. 3–29), E. Bährens (*Fleckeisens Jahrbuch*, 103, pp. 856–858), W. Härtel (*Oestreich. Wochenschrift f. Kunst und Wissenschaft*, 1872, pp. 161–172), and J. G. von Hahn (*Griechische und Albanesische Märchen*, ii, 250), have searched for Greek color and allusions in the earliest Latin versions and have found sufficient to justify Teuffel's conclusion that the original author was a pagan Greek from Asia Minor ("Der Verfasser desselben war vielleicht aus dem griechischen Klein-Asien und noch Heide," *Rh. Mus.*, xxvii, 104). Teuffel adds (*id.*, 103), "das christliche Gewand ist dem Stoffe erst von dem Uebersetzer lässig umgeworfen." A list of the græcisms may be found in Riese, ed. 1871 (xi–xiii). Haupt denied the Greek origin, but was confuted by Rohde. See Thielmann, *Ueber Sprache und Kritik des lat. Apollonius Romans*, Speier, 1881, for arguments for the Latin origin of the story.[1]

---

[1] *῾Ηελιοδώρου Αἰθιοπικῆς ῾Ιστορίας Βιβλία δέκα*, Heliodori Historiæ Æthiopicæ libri decem, nunquam antea in lucem editi (ed. by V. Obsopaeus). Basiliæ, 1534.

There is a singular relationship which cannot be explained as an accidental coincidence between the Apollonius and the Greek sophistic romance of Antheia and Habrokomes, of Xenophon of Ephesus—Xenophontis Ephesii Ephesiacorum, libri V, de Amoribus Anthiæ et Abrocomæ nunc primum prodeunt . . . . cum Latina interpretatione A. Cocchii, London, 1726.[2]

Antheia and Habrokomes meet in the Temple of Diana, are married, but in obedience to an oracle of Apollo are forced to travel. They become separated and A. falls into the hands of robbers, from whom she is rescued by Perilaus, a young nobleman. A. consents to marry him but, on the eve of the marriage, swallows a sleeping potion which she had secured from a physician, a friend of Perilaus, to whom she has confided her story.[3] She is lamented as dead, and is conveyed to a sepulchre. She awakens in the tomb which is plundered by pirates for the sake of the treasure it contains.

The bold outlines of the narrative are common to both the

---

[1] Cf. E. Klebs, Phil. 47, 80, for evidence that the story is a version of a pagan Latin work of the third century.

[2] Cf. Dunlop *History of Prose Fiction* London, 1888, Vol. i, pp. 61–63. Angelo Poliziano mentions the Ephesian History—*Σφεσιαχὰ τὰ Κατὰ 'Ανθίαν και 'Αβροκόμην*—in his Liber. Miscell., li. It was translated into Italian in 1723. There are two other Xenophons nearly contemporary—X. Antiochenus and X. Cyprius.

[3] Douce ("Illustrations") observed that these incidents resemble the leading adventure of *Romeo and Juliet* though he admits that Xenophon's work was not translated nor published when Luigi da Porto wrote the novel *La Giulietta* on which Shakespeare's play is based. The story was everywhere popular. Lopez de Vega wrote a play upon it—*Los Castelvines y Monteses.*

Ephesiaca and the Apollonius. The marriage of the principal figures of the romance is in both instances at the beginning and not at the end of the adventures. The stories are alike in the intended assassination of the heroine by a slave commissioned by a jealous mistress; the compassion of the murderer; the escape of the heroine; her preservation of her purity in a brothel, and the final recognition of the lovers in a temple by means of the hero's repetition in a loud voice of his adventures. Apollonius is succoured by an old fisherman of Cyrene; Habrokomes sojourns with a fisherman of Syracuse. Rohde conjectures that the idyllic sequestration of such a picture of contented poverty called forth imitators (*Der griechische Roman*, p. 412). The wife of Apollonius is regarded by mistake as Artemis herself, and the same mistake is made with regard to Antheia. The correspondence between the two romances is briefly indicated by W. Meyer (*Sitzungsberichte der Münch. Akad. Phil. Cl.*, 1872, p. 3), and the parallelism is more fully made out by Rohde (*Der griechische Roman*, pp. 412, 413). The latter even finds in the brevity and dryness of the narrative an indication of a significant correspondence of manner in the two narrators, for the usual romantic style of the period was overflowing with pathos and color.

A correspondence so exact and even verbal is only explicable upon the theory that one of the narrators was the imitator of the other. Of course it is quite conceivable that some Latin follower of later Greek sophistry had ventured an imitation of the Greek prototypes of erotic romance poetry, but the possibility of such an explanation disappears, and the conviction that the Latin Apollonius is a translation of an original Greek romance becomes irresistible when the student discovers in the text—as in a palimpsest, Rohde says—a double stratum of pagan-Greek and Christian-Latin conceptions, customs and turns of expression. It is clear enough that the pagan ground work and the clumsily adjusted Christian additions are by different hands; and if in the oldest Latin version two writers are found to be engaged upon the old text there is hardly a more simple explanation conceivable than that a Greek romance originally written by a Greek of the ancient faith was translated by a Christian of the Latin half of the empire. The love of arts evinced by both men and women in the Apollonius romance smacks more of Greek manners than of Roman, or Christian-Roman iconoclastic zeal; while such a passage as that in which the fisherman divides his cloak with Apollonius resembles the story of St. Martin and indicates an origin in the Vulgate.[1]

When Tharsia plays upon the harp in the cabin of Apollonius' ship, she proposes to the king, in order to dispel his melancholy, certain riddles derived from the collection of Symphosius.[2] Here there is a reminiscence of a popular kind of Oriental *märchen* in which the sad and the sick are cheered and healed, by jugglers, mountebanks and fools. J. G. von Hahn, in *Griechische und albanesische Märchen*, ii, 250, collects some parallels to the Apollonius-Tharsia story that are useful for comparison. He does not mention the *Apollonius*, but he quotes from Apollodor, iii, cap. vii, para. 7: "Euripides sagt [*i. e.*, in his second tragedy *Alkmaön*], Alkmaön zeugte zur Zeit seines Wahnsinns mit Manto, der Tochter des Tiresias, zwei Kinder, Amphilochos und Tisiphone. Er brachte die Kinder nach Korinth, und übergab sie dem König der Korinther, Kreon, zur Erziehung. Die Tisiphone aber welche sich durch ihre Schönheit auszeichnete wurde von der Gattin des Kreon in die Sklaverei verkauft, weil diese fürchtete, dass sie Kreon zu seiner Frau machen könnte. Alkmaön kaufte sie und hatte sie zur Sklavin, ohne zu wissen, dass es seine Tochter sei. Als er darauf nach Korinth ging, um seine Kinder abzuholen, brachte er auch von dort seinen Sohn mit." Hahn compares the Euripidean story with the northern saga of Aslaug, daughter of Sigurd: "Aslaug als Kind von einem Harfner in seiner Harfe geborgen wird, so ergiebt sich in dem Zitherspiele der jungen Heldin des griechischen Märchens ein neues Verbindungsglied zwischen Aslaug und Tisiphone." The story of Tisiphone is repeated in India. Benfey, *Pantschatantra*, ii, 201, relates: "Ein König wendet einem Schuhmacher seine Gunst zu, und vertraut ihm sein Söhnchen an. Der Schuhmacher entführt den Knaben in seinem 4ten Jahre, beraubt ihn seiner

---

[1] "Sic piscatorem dimidiam sagi partem Apollonio naufrago dantem ad sancti Martini exemplum [Sulpic. Sever. Vita S. Mart. c. 3] conformavit," Riese, ed. of 1893, p. xviii. The story of Tharsia in the house of the Pander reappears in the ecclesiastical legends, *e. g.*, the legend of St. Agnes. Cf. Simrock, p. 119.

Cf. *Leben und Wunderthaten des Heiligen Martin. Altfranzösisches Gedicht aus dem Anfang des XIII. Jahrhunderts von Péan Gatineau* (*aus Tours*). Herausgegeben von Werner Söderhjelm, Prof. Univ. Helsingfors, in Bibliothek des Litt. Vereins in Stuttgart, 1896, Vol. 210.

[2] The riddles of Symphosius or Symposius are to be found in many editions. Cf. *Cent Enigmes à la Mànière de Symposius*, Auguste Du Bois [1868]; *Epigrammata et Poematia Vetera*, 1590. The author was Caelius Firmianus Symposius. See also the conclusion of the *Phaedrus* of Joannes Meursius, 1610.

Kostbarkeiten und verkauft ihn als Sklaven. Der neue Herr verkauft ihn an seinen Vater, der ihm seine Gunst zuwendet; diese benutzt des Königs Juwelier um ihn zu verführen des Königs Siegel zu stehlen; als ihn dieser dafür hinrichten lassen will, und ihn entkleiden lässt, erkennt er in ihm an einem Male seinen verlorenen Sohn."

The Volksmärchen are marked by childlike simplicity and naïvete. They translate the reader into a realm of extravagant fancy where

> "One vast realm of wonder spreads around,
> And all the muse's tales seem truly told."

The gold that is sown so liberally is fairy gold, and the kings and princesses are fairy people. Not seldom, however, in the midst of the thaumaturgy of the Apollonius narrative a scene is half disclosed that reveals the presence of the attentive and skillful Greek rhetorician who was the first to handle the romance. Thus the scene at the beginning of the banquet with King Archistrates is perhaps modeled after the meal of Menelaus in the *Odyssey*. Rohde thinks also that the grace of an original picture has been blurred by the copyist in such scenes as the courtship of the three youths, and the old king's roguish familiar treatment of them; the discovery of the chest by the physician, Cerimon, and his precociously smart pupil; and the half-scurrilous, half-farcical manner of the bawd.

On the other hand, Riese points out (Vorrede, p. xv) that certain boorish witticisms may likely have been introduced into the narrative by the Latin author.

Here then are sufficient indications from every source that the romance was originally a work of sophistic rhetoric, though presumably of the simpler sort after the style of Xenophon.

Its scenery is the coast lands and islands of the Mediterranean; its pirates and other malefactors are the usual evil-doers of the sophistic romance; its motives are external, accidental and fatalistic. Under the hands of the Latin scribe the rhetorical romance was transformed into a *Volksbuch*, which accounts for its widespread popularity in the Middle Ages.[1]

---

[1] The Latin text even in the oldest extant MSS. shows traces of provincialisms and of the influence of popular usage. This passage of a pseudo-classical romance into a *Volksbuch* is alluded to by Riese in his edition of 1893: "Inter quae sunt popularia quaedam, quae iam prorsus linguarum romanarum prae se ferunt imaginem, ut ablativi illi *in matrimonio postulabant, populi* — homines, *habet annos* (gallice *il y a des Ans*), *quid est hoc quod* (gallice *qu'est ce que*), alia.

Before we leave this aspect of the romance it may be well to attend a moment to a conjecture which Prof. Erwin Rohde has developed with much ingenuity. He imagines that the Latin scribe broadened the trend of the story by an addition that is not particularly successful. In the first part of the romance Apollonius is introduced as a suitor for the hand of Antiochus' daughter. He is rebuffed and goes abroad. We should expect that his vain wooing would cause him some grief, but we have no word of sorrow or regret. On the contrary, he pledges his love to the first maiden who looks upon him with favor and compassion. King Antiochus and his daughter could be spared from the story altogether and the rest of the narrative not suffer in the least. It is true that King Antiochus reappears occasionally, and that at his shipwreck on the coast of Ethiopia Apollonius cries out that Neptune is more cruel than Antiochus. The wicked king dies by lightning and Apollonius claims his *paternal* kingdom (cum desiderassem properare ad patrium [meum] regnum percipiendum). He journeys into Egypt where he remains fourteen years. Why does he not go to Antioch? "After the loss of my dear wife I will not take possession of the kingdom," he says to his friends of Tarsus. It seems natural enough to them, but not to us. We know nothing of the kingdom for fourteen years, but when all the family are again united we learn that Apollonius took possession of the kingdom and that all was well. Prof. Rohde therefore concludes that Antiochus, his daughter and his kingdom, have nothing to do with the fable, and that the Antiochus episode had been first prefixed to the romance and then clumsily interwoven. Perhaps the Latin scribe was moved to introduce this prologue by the necessity of providing a motive sufficiently strong to send forth this luxurious king of Tyre a lonely ocean waif. The Greek poet might have found this motive, as in Xenophon, in an oracular response impelling and exhorting Apollonius to action, but the Christian poet could hardly accept the domination of human action by the oracle of a heathen dæmon. He must change the motive, and the one which he chose to substitute for the original he found freely developed in Greek myth and saga. The tale of the father who loves his own daughter, and who deters suitors by imposing upon them difficult tasks, is the story of Œnomaus, who, loving his daughter Hippodamia, delays her marriage through chariot races with her suitors; Sithon who loving his daughter Pallene slays her lovers in single combat; the father of Side loves his own daughter and she kills herself upon her mother's grave, and is transformed into a pomegranate tree, and her father into a buzzard (see Grimm, *Deut. Sagen,* 483 (ii, 182), and Rohde, p. 420, note, for references to Servian and Persian folk-tales).[1]

So much for Prof. Rohde's riddle-guessing. This much of good is in it, that it has pointed out the incongruities and the weaknesses of the tale as we have it. The whole episode of the first sojourn at Tarsus might be spared, nor is there any explanation of the sudden departure for the Pentapolitan region of Cyrene. The words of the author are "Interpositis mensibus sive diebus paucis, hortante Stranguillione et Dionysiade et premente fortuna ad Pentapolitanas Cyrenæorum regiones adfirmabatur navigare ut ibi latere posset." The monument erected to Apollonius is referred to by Lycoris who advises Tharsia when in need to take refuge by the statue of her father; and Hellenicus, too, reappears at the end of all to remind Apollonius of his fidelity.

THE ANTIQUITY OF THE STORY.

Moritz Haupt, of Berlin, wrote to Tycho Mommsen in 1857, that he knew of more than one hundred manuscripts of the Latin Apollonius. They are widely distributed, a dozen MSS. are in England, seven in Vienna (Nos. 226, 362, 480, 510, 3126, 3129, 3332), two in Breslau, three in Munich, and others in Paris, Rome,[2] Stuttgart (fol. 411), Berne (228), Leipsic, Göttingen, Basle and Buda-Pesth. The oldest is a Florentine Codex of the ninth or tenth century. The earliest publication of the Latin text seems to have been about 1470.[3] The unique copy of it in the Vienna Hofbibliothek lacks the title page, and the volume remained undescribed until it was collated by S. Singer and its readings quoted in his *Apollonius von Tyrus* (1895). The next edition was made by Marcus Velser in 1595 from an Augsburg MS. which is now lost. It is entitled "Narratio eorum quae contigerunt Apollonio Tyrio, ex membranis vetustis. Augustae Vindelicorum ad insigne pinus, anno 1595." This edition consisted of twenty-three quarto leaves. It was reprinted in Velseri Opera, 1682 (p. 677).

---

[1] If the Latin scribe followed the opinion of Mallalas that Antioch was named after the son of Seleucis, he may have had a dark recollection of that particular Antiochus' love for his mother-in-law.

[2] O. Riemann has collated two MSS. in Rome; the one is in the Minerva Library (A. I., 21), the other in the Library of the Vatican (foundation of Queen Christina, No. 905). Both are of the thirteenth century. The collation of chapters 28–31 (where the Laurentian is at fault), is published in *Revue de Philologie,* Tome vii, 1883 ("Note sur deux Manuscrits de l' Historia Apollonii Regis Tyri). Still another MS. in the Vatican (7666) is described by Bethmann. It is of the fifteenth century and resembles *Sloan,* 1619 (Cf. Pertz, Archiv 12: 402).

[3] Riese says *circa* 1471; Brunet "antérieure à 1480;" Grässe "vers 1470." See Hain, 1293.

In 1856 appeared *Erotici Scriptores, ex nova recensione,* G. A. Hirschig, Parisiis, ed. Didot, in which between pp. 611 and 628 is found "Eroticam de Apollonio Tyrio Fabulam ex codice Parasino emendatius edidit et præfatiuncula notulisque instruxit. J. Lepaume Lingonensis." The edition is a poor one. The *præfatiuncula* occupies pp. 601–608, and is dated August, 1855.

An edition in Latin verse was edited by Dümmler in 1877—"Gesta Apollonii Regis Tyri metrica, ex codice Gandensi," edidit E. Dümmler, pp. 20, Berolini, 1877, 4°. It appeared again in "Monumenta Germaniæ Historica, edidit Societas Aperiendis Fontibus Rerum Germanicarum medii ævi," Berolini, 1884; it is found in the second volume—"Pœtæ Latini ævi Carolini, Recensuit Ernestus Dümmler." It occupies pp. 483–506, is in leonine verse, with Virgilian reminiscences, and is printed from an eleventh-century MS. preserved in Ghent: "Codex membranaceus, sæculi XI, bibliothecæ universitatis Gandensis, Nr. 169, signatus constat 229 foliis. Scriptum autem eum esse in monasterio hujus civitatis sancti Petri testatur paginæ 454 subscriptio 'liber sancti Petri Gandensis ecclesie . . . . servanto benedictio . . . . tollente ma'edictio . . . . qui folium ex eo tulerit uel certauerit Anathema sit.'" Dümmler in his *præfatio* says, "Pœta noster fabulam suam omnem ex historia Apollonii regis Tyrii pedestri oratione conscripta mutuatus dilatando copiosiorem ornatioremque reddidit. Utrum ad finem eam perduxerit necne ignoramus, quia fortuito duo tantum codicis folia cæteris deletis ad nostram usque ætatem pervenerunt."

Tycho Mommsen, who has spent many years of his long and learned life in the study of the Apollonius story, gave his collations of MSS. to Alexander Riese in 1871, who published in the Teubner Classics in that year a volume, *Historia Apollonii Regis Tyri.* A few years later Michael Ring edited the previously unknown Paris Codex, and published *Historia Apollonii Regis Tyri e codice Parasino* 4955, *edidit et commentario critico instruxit, Michael Ring, pp. 20, Posonii et Lipsiæ, 1887.* Riese reviewed Ring's edition in *Berliner Philolog. Wochenschrift*, 1888, p. 561, and decided that the new text was of such importance as to render it necessary that his own publication should be recast. Accordingly he issued *Historia Apollonii Regis Tyri, iterum recensuit, Alexander Riese, Lipsiæ, in ædibus B. G. Teubneri, mdccclxxxxiii*, with an entirely new Preface, in which he repeats his acknowledgments to Tycho Mommsen, and confesses his obligation to Maximilian Bonnet, who carefully collated anew the Paris Codex after the appearance of Ring's volume. This final work of Riese was completed at Frankfurt-am-Main, December, 1892.

So far as the MSS. have been examined, they are found to differ widely in language and construction, but to cling rather persistently to the type of the story. An account of such of the MSS. as have been collated may be found in Georg Penon, *Bijdragen tot de Geschiedenis der Nederlandsche Letterkunde*, 1880; W. Meyer, "Abhandlung über den lateinischen Text der Geschichte des Apollonius von Tyrus" (in *Sitzungsberichte der philosophisch und hist. Cl. d. kön.-bay. Akad. d. Wissen. zu München*, 1872, Heft I); A. Riese, *præfatio* to *Historia Apollonii Regis Tyri;* Carl Schroeder, *Griseldis*, S. xii, xiii; Mauricii Hauptii, *Opuscula*, Lipsiæ, iii, 4, 5 and 6; Piper, *Höfische Epik*, iii, 376; Zupitza, *Roman. For.*, iii, 269; Hermann Hagen, *Der Roman vom König Apollonius von Tyrus in seinen verschiedenen Bearbeitungen*, Berlin, 1878, and S. Singer, *Apollonius von Tyrus*, Halle, 1895.

The MSS. in the British Museum have been carefully studied and catalogued by L. H. D. Ward, *Catalogue of Romances*, i, 161–171. He enumerates Sloane 1619 (early thirteenth century); Arundel 292, (late thirteenth century); Arundel 123 (early fourteenth century); Cotton, Vespasian A, xiii (fifteenth century); Sloane 2233 (seventeenth century); Royal 20, C. ii (fifteenth century); Additional 4857 (A.D. 1669–1670); Add. 4864 (1770), Cotton, Titus, D. iii (early fourteenth century); Royal 14, C. xi (early fourteenth century).

The editio princeps is Laurentianus lxvi, of the ninth or tenth century, in Lombardy characters. It is fairly free from grave faults and misconstructions, and would have been followed by Mommsen had it been complete, but certain parts are missing (see Riese, 1893, p. iv). The Paris Codex which M. Ring edited is next in value to the Laurentian, which it resembles, though it is much more recent, belonging to the fourteenth century. These two MSS. Riese now assigns to the first class, and by their aid he remodeled his earlier version.

In the second class he places *Oxoniensis collegii Magdalenæi* 50, which contains the entire story (pp. 80–108) in a handwriting of the eleventh century. *Vaticanus* 1869, was examined by W. Meyer and pronounced similar to *Oxon. Magdal.* (*Sitzungs. d. Mün. Akad.*, 1872, p. 8). *Vossianus* 113, of the ninth or tenth century (pp. 1–78), agrees with the above.

The *Tegernsee* MS., now *Munich* 19148, although mutilated (it consists of only nine and one-half leaves), is of much value, and its readings were admitted into Riese's first edition.[1] It coincides more often with the *Oxon.* than with the Laurentian or Parisian codex. I have examined the MS. and agree with Riese that Meyer has exaggerated the importance of its unique features (cf. Riese, vii). Even when Riese has adopted the Tegernsee readings without comment he does not wish his silence to be interpreted as evidence of the genuineness of the passages ("cave autem ne ex silentio meo lectiones eorum pro certo constituas").

The *Vindobonensis* (Vienna), twelfth century, Meyer says agrees with *Tegernsee.*

Riese's third class of MSS. contains a great number of versions, more boldly and more recently tampered with. To this class he relegates *Sloanianus* 1619;[2] *Bodleianus* 247 (Laud. H. 39) (twelfth or thirteenth century); *Monacensis* 215 (anno 1462),[3] and *Bernensis* 208 (saec xiii).[4]

As the MSS. have come to be better known, a change of opinion has taken place as to their relative value. Teuffel believed the third class which I have just cited to contain the best versions (see his account of *Sloan* 1619, in *Rh. Mus.* 1872, p. 103). Haupt also believed the Velser codex to be preferable to those out of which Riese composed his first edition. And Velser's Augsburg MS. belonged very clearly to the same class as *Sloan* and *Berne*. For proof that Velser's text was corrupted, cf. Riese, 1893, pp. xi, xii.

---

[1] Cf. L. Traube, *Neues Archiv. d. Gesellschaft für ältere deutsche Geschichtskunde*, 10, 1884, p. 382.

Riese drew so liberally from the different MSS. in preparing his edition that Rohde described his method as "eine wunderliche eklektische Vermischung der Texte" (*Der griechische Roman*, 418). Riese's first edition is reviewed in *Göttingische gelehrte Anzeigen*, 2, 1839–1840; *Literarisches Centralblatt*, No. 50, 1872, p. 1370; *Philologischer Anzeiger*, iii, 1871, 536-539; *Jahrbücher für Philologie und Pädagogik*, 1871, Vol. 103, p. 854; *Philologus*, xxxi, 562.

[2] Riese believes *Sloan* 1619 to belong to the eleventh century; Ward dates it in the thirteenth century; it is impossible that it should be of the eleventh century.

[3] This MS. I have collated; it is a bold paraphrase, without linguistic or literary value.

[4] The Berne MS. was collated by H. Hagen. Cf. *Philol. Anz.*, ed. Leutsch, 1871.

The earliest reference to Apollonius that has been discovered is in the sacred lyrics of Venantius Fortunatus,[1] bishop of Poitiers, (inter annos 566 et 568) where he compares his own sad, exiled wanderings in Gaul with those of the shipwrecked Apollonius—

> "Tristius erro nimis, patriis vagus exsul ab oris,
> Quam sit Apolloniis naufragus hospes aquis."

Another reference is found in the *Gesta Abbatum Fontanellensium*, written about 750 A.D. In the thirteenth chapter, entitled "Gesta Wandonis abbatis cornobii Fontanellensis," occurs the following: "Wando presbyter a patre Baldrico nomine progenitus territorio Tellau ortus, regimen assumpsit cornobii ab anno dominicæ incarnationis 742." Among the books belonging to this abbot is cited, "Item historiam Apollonii regis Tyri in codice uno" (see *Monumenta Germaniæ historica*, edidit G. H. Pertz. Scriptorum. Tomus ii, Hannover, 1829, p. 287).

A still earlier reference than the former is in "Tractat de dubiis nominibus," a grammatical index found in a Vienna MS. of the seventh century. The latest writer cited in it is the poet Dynamius, a Gaul of the sixth century.[2] It seems clearly made out that the "index" was compiled in the Merovingian times, or, as Haupt says, "In einer Zeit wo im Uebergang des Lateins in die romanischen Sprachen durch Erhebung der Accusative zu Nominativen und durch andere Vermischungen und Entstellungen von denen besonders Urkunden vielfache Beispiele darbieten, das Geschlecht der Wörter unkenntlich wurde, später als die romanische Sprachniedersetzung vollbracht war und das Latein in den Karolingischen Schulen ungetrübt durch romanische Formen gelehrt ward, war zu so ganz trivialen Bemerkungen wie sie jenes Verzeichniss enthält ebensowenig ein Anlass als sich gleichartige Beispiele finden" (Haupt, *Opuscula*, p. 13). The reference in the "De dubiis" reads "Gymnasium generis neutri sicut balneum in Apollonio 'gymnasium patet.'" The quotation is from the scene in *Pentapolis*, when the boys cry aloud, "Audite, cives, audite, peregrini, ingenui et servi, *gymnasium patet*" (see *Rh. Museum für Philologie*, neue Folge xxvi, S. 638–9, xxvii, 103–114).

---

[1] Venantius Fortunatus, *Miscellanea* Lib. vi, cap. 10, lines 5 and 6. The lines are cited as above in Migne's *Patrologiæ* T. 88, and Migne reprints the best edition of Fortunatus, that of the Benedictine, Mich. Ang. Luschi. Luschi notices the variants "Apollonius" and "Apollonia," but prefers "Apolloniis," as above. Fortunatus is venerated in the diocese of Poitiers as a saint, his feast being celebrated December 14.

[2] Dynamius, Governor of Marseilles, was born at Arles, and lived at the end of the sixth century. See Moreri, *Dict. Hist.*, 1725, iii, 646, and *Biographie Universelle*, Vol. 12.

In chapter 34, forty aurii are considered more than a half libra auri, yet not a whole one; that is, one pound of gold is coined into fifty pieces, which coincides with the practice of the time after Caracalla.[1] After Constantine it became customary to compute by solidi. The oldest Latin version therefore would appear to have been composed in the time between Caracalla and Constantine (see W. Christ, *Sitzungsberichte d. Akad. d. Wissenchaft zu München Cl.*, 1872, p. 4, and Marquardt *Röm. Altertum*, iii, 2, 18, 24).

As the translation was certainly made *before* the verses of Venantius and the treatise "De dubiis," it was as certainly made *after* Symposius, whose riddles are inserted. The collection of riddles is contained in many MSS. The oldest is the Codex Salmasianus, belonging to the end of the seventh or the beginning of the eighth century. The riddles themselves are of earlier date. Teuffel says: "Etwa aus dem vierten bis fünften Jahrhundert stammen wohl die hundert Räthselgedichte des Symphosius. Sie bestehen je aus drei Hexametern nebst einem ungeschickten Prolog. Sprache und Versbau sind in reinem Geschmacke und zeigen den Verfasser als einen Nachahmer des Ausonius," (Teuffel, p. 1061, 3d ed.; see also Douce, *Illustrations of Shakespeare*, 1807, ii, 135; and Riese, *Zeitschrift für Oestreich. Gymn.*, xix, 1868, 483–500).

From these arguments we may infer, as Velser, Fabricius[2] and Douce have done, that the original Latin text was compiled some time in the fifth century. Teuffel says, "in the course of the sixth century," which agrees also with the general character of the Latin and especially with the peculiar use of *dos* in a sense opposite to the Latin meaning, but peculiar to the German period = pretium puellæ, *Muntschatz*. (Teuffel, 481.)

---

[1] Haec dicens protulit XL Aureos et dedit in Manu virginis et dicit, etc. . . . . cui juvenis ait "si salva sis, indica mihi, quantum dedit at te juvenis," etc. . . . . Puella ait "quater denos mihi Aureos dedit." Juvenis ait "Malum illi sit! quid magnum illi fuisset, homini tam diviti, si *libram auri* tibi daret integram? Ut ergo scias, me esse meliorem, tolle libram auri integram." (Riese, 1893, p. 71).

[2] Fabricius, *Bibliothecæ Græcæ*, Hamburg, 1721, l. 5, c. 6.

THE PERSISTENCE OF THE STORY.

The Apollonius Saga is remarkable for its *persistence* and its *stability*, that is for its duration and vitality, and for its retention of its original character and form. We will consider first its *persistence*.

The remarkable number of MSS. attests the wide popularity of the story before the introduction of printing. William, Bishop of Tyre, in the twelfth century, in referring to his bishopric, testifies to the fame of the romance—"ex hac etiam et Hiram Salomonis cooperator ad aedificium templi domini rex fuit et Apollonius *gesta cujus celebrem et late vulgatam habent historiam.*" About 1186 Godfrey of Viterbo related the story as authentic history in his *Pantheon, or Universal Chronicle* (Pertz, *Archiv* v, 166; vii, 559), a sort of rhymed record of events from Adam to Godfrey. The author was chaplain to Conrad III, Frederick I and Henry VI. The principal MSS. of the work are Vienna 3406, and Paris 5003. It has been printed in *Germanicorum Scriptorum Tomus alter, ex bibliotheca Joannis Pistorii Nidani D. editio tertia curante B. G. Struvio, Ratisbonæ, Sumptibus J. C. Peezii*, 1726, pp. 175–181.

Godfrey's *Pantheon* is an important monument and deserves more particular attention. My study is based upon a copy in my own possession. It is a ponderous folio with the title: *Pantheon sive Universitatis Libri qui Chronici appellantur, xx, omnes omnium seculorum et gentium, tam sacras quam prophanas Historias complectentes: per V. C. Basiliæ ex officina Jacobi Parci* (1559). It is dedicated to Pope Urban III (1185–1187).

After a description of Rome and Carthage, of Asdrubal and Hannibal, we arrive at the subject of our story, in column 282—"His temporibus Apollonius rex Tyri et Sidonis ab Antiocho juniore Seleuco rege à regno Tyri et Sidonis fugatur: qui navigio fugiens, mira pericula patitur." Gower explicitly says that he derived the story as narrated in *Confessio Amantis* from these chapters of the *Pantheon*.

> "Of a cronique in daiēs gon
> The wich is cleped Panteon
> In lovēs cause I redē thus."

The titles of Godfrey's chapters will be sufficient to indicate the course of his narrative and its close parallel to the oldest Latin MSS.

1. De Apollonio rege Tyri et Sidonis, et de ejus infortunis atque fortunis.
2. De eodem Apollonio fugiente a facie Antiochi.
3. Item de eodem Apollonio naufragium passo.
4. Item de Apollonio, ubi suscepit eum rex Archistrates et dat ei filiam suam.
5. Item de Apol., ubi mortuo Antiocho ipse eligitur in imperium Antiochiæ.
6. Apol. tendit Antiochiam, sed uxor ejus in partu mortua projicitur in mare.
7. Apol. relicta filia in urbe Tharsia, pergit Antiochiam.
8. Tharsia, filia Apollonii capitur a piratis et venditur lenoni in civitate Militena.
9. Tharsia venditur a piratis in urbe Militena ubi regnat Athenagoras, qui saluat eam a Stupro.
10. Apol. pergit ab Antiochia in Tharsiam urbem requirere Tharsiam filiam suam.
11. Apol. recognoscit et recipit filiam suam in urbe Militena, per regem Athenagoram.
12. Tharsia recognoscitur a patre suo Apollonio.
13. Apol. recipit filiam ignotam et fit lætitia magna in urbe Militena.

Apoolonius [*sic*] visitat socerum Archistratem.

Godfrey's stanza consists of two rhyming hexameters and a pentameter verse. For further editions of Godfrey, cf. Grässe, *Tresor de livres rares et précieux*, iii, 100.

It is said in the bibliographies of Apollonius that the story is contained in Vincentius Bellovac, *Speculum hystoriale*, printed at Augsburg in 1474, but after struggling patiently through the three immense folios in the British Museum I must confess that I have been unable to find the slightest trace of the romance.

There are three main sources of the endless stories of Apollonius in the Middle Ages. They are either founded upon the Latin Historia, or they proceed from Godfrey, or the *Gesta Romanorum*.[1]

---

[1] Editions by Oesterley, 1872, and Keller, 1842. The Colmar MS. (fourteenth century) is the only old MS. which contains the Apollonius. Cf. Wichert, *Zeitsch. f. deut. Geschichtsforschung*, vi.

From Godfrey the story entered England (Gower and Shakespeare) and North and South Germany; from the *Gesta Romanorum* arose the popular versions among the romance peoples, and in Holland, Hungary, Sweden and Russia. In my review of the various national versions of the story I shall indicate whenever possible the genesis and dependence of the texts.

German Versions.

The Alexanderlied of the early twelfth century closes its account of the plundering of Tyre with the lines

"Zerstoeret lac do Tyrus
die stifte sint der Künec Apollonius
von dem di buoch sagent noch
den der Künec Antioch
über mer jagete
wande er ime sagete
ein retische mit vorhten
daz was mit bedahten [bedecketen] worten
geshriben in einem *brief*
daz er sin selbes tohter beslief."

Lamprecht who wrote these lines lived during the first half of the twelfth century, and his source of information was an old romantic poem of Alexander by Alberic de Besançon,[1] of which the beginning only survives. Weismann, who edited Lamprecht in 1850, was led by the line "Geshriben in einem brief," to believe that L. knew the story inaccurately. Now in a Stuttgart MS. of the Latin Apollonius certain German verses in the form of a narrative are appended to the riddles, whence Massmann concluded, in connection with Lamprecht's own words, that there must have been a German version of the story before Lamprecht. But Weismann and Penon after him have regarded these verses as a first attempt and not as verses copied from a previously existing versification of the story (see Massmann, *Denkmäler*, 1828, Vorrede, p. 10, and Lamprecht's *Alexander*, v, 1054). The explanation of the "brief" or "letter" as found in the *Alexander* poem is not difficult. In *Shakespeare* Antioch hands to Pericles a writing which contains the riddle, saying:

---

[1] Cf. Koberstein *Grundriss der Geschichte der deutschen Nationalliteratur*, i, 161; Bartsch, *Chrestomathie de l'ancien français*, 2me edition, 17–20.

> "*Read* the conclusion, then;
> Which read and not expounded, 'tis decreed,
> As these before thee, thou thyself shalt bleed" (i, 1[1])

In Godfrey of Viterbo, too, "Antiochi regis scelerum problemata *legit*," but there the riddles are read over the gate of the city where they are inscribed. The Lapaume edition has it that the riddle had been inscribed upon the gate of the city (quia questio conditionis in porta civitatis scripta erat). In the Cretan version the riddle is written upon the wall. Other versions, the Italian, Spanish, Bohemian, Copland, etc., repeat the same method of conveying the riddle to Apollonius. Shakespeare is the only one who speaks of the riddle as written upon *paper;* all the others have it written over the gate or on the wall. Lamprecht's reference indicates that in some lost version the narrator had anticipated Shakespeare in this invention. Lamprecht's lines quoted above may be translated "King Apollonius of whom the books still tell, whom King Antioch pursued over seas because he told him a gruesome riddle, which was written with covered words, *in a letter.*" They stand thus in the Strassburg MS. of the Alexander. The Vorau version omits the reference to the "covered words" (bedecketen worten) and reads, "he solved a riddle in a letter" (missive). The original meaning no doubt was, as in the lines above quoted, that the *riddle* was communicated in a letter, but was misinterpreted by Kinzel, who supposed the *solution* to be conveyed in a letter, *i. e.* in a missive. The Basle edition also interprets after this fashion and states explicitly "dar umb, daz er im sagtte und im des sante brieff, daz er sin dochter beslieff" (because he told him, and sent him a letter to that effect, that he, etc.).[2]

The first poet in Germany to work independently upon the Saga was Heinrich von Neustadt, who finished his *Apollonius von Tyrland* (a poem of 20,893 verses) at the beginning of the fourteenth century.[3]

Heinrich was a physician in Vienna, and naturally was interested in the story of the resuscitation of Lucina, the wife of Apollonius. In his poem he shows an interest in natural history, and introduces lists of fishes, stones and spices. But the deviations from the *Historia* we will consider elsewhere (verses 2913–15106 relate to incidents which are not found in the Latin story).

---

[1] In Gower and Twine the riddle is *spoken*, as in the Latin, *not* read.

[2] Cf. Singer, p. 37.

[3] Heinrich von Neustadt, *Apollonius. von Gotes Zuokunft*, herausgegeben von Joseph Strobl, Wien, 1875. Pudmenzky, *Shakespeare's Pericles und der Apollonius des Heinrich von Neustadt*, Detmold, 1884.

At the close of the poem Henry introduces into his rhyme his name and address—

> "Wie ditz puoch si erdaht
> unde in deutsche rime praht
> daz sage ich eu dast pillich
> ez geschach ze Wienne in Osterrich
> waz ich sage daz ist war
> ez sint me dau tousent jar
> daz ditz puoch zem ersten wart geschriben
> in Latin: sit ez ist pliben
> *daz es nie von keinem man*
> *solhe rime geschriben gewan*,[1]
> wer ditz puoch gedihtet hat
> daz sage ich eu des ist niht rat,
> ein schoeneu frouwe in drumbe pat:
> Meister Heinrich von der Neuwenstat
> ein arzet von den puochen.
> wil in ieman suochen
> er ist gesezzen an dem Graben
> got muez in in siner huote haben"
> (*Strobl.*, p. 124, lines 20,844-20,861).

In *Von Gotes Zuokunft* (line 467), the poet again alludes to his Austrian nativity. The latin book of the Apollonius he says he obtained from Nicolas of Stadlaw:

> "der saelic pfarraere
> her Niclas von Stadlouwe."

Nicolas lived, as Ferdinand Wolf has demonstrated (*Wiener Jahrbücher der L.* ii, 56, 257), in the first quarter of the fourteenth century. He appears in the records of the years 1297–1318, together with Bernhard von Krannest, of whom there are records from 1304 until 1332, and who also is referred to in the poem (line 13,696). In 1312 Heinrich and his wife Alheit were given the Freisingerhofe, located upon the Graben in Vienna. It was therefore after he was "gesezzen an dem Graben," or after 1312, that he wrote *Apollonius*, which from various other reasons is believed to have been preceded by the other composition of the same author (*Von Gotes*

---

[1] This declaration that before Heinrich no translation had been made from the Latin into German rhyme, strengthens Weismann's theory quoted above.

Zuokunft), in which there is no reference to the house upon the Graben.

Two German prose translations of the Latin text of the *Historia* were published in 1873 by Carl Shröder.[1] The first is from a manuscript of the fifteenth century, now in Leipzig,[2] in the handwriting of a Saxon monk who lived probably in the neighborhood of Meissen.[3] The other is in a MS. of the same century at Donaueschingen, written in the Suabian dialect and closely resembling the *Volksbuch* written by Heinrich Steinhöwel and published by Gintherus Zainer von Reutlingen at Antwerp, in 1471—*Die hystory des Küniges Appollonij vo latin zu teutsch gemachet, Gintherus Zainer von Reutlingen. Augspurg, 1471*, fol. (31 leaves; 35 lines to the full page; without pagination, signature or catch words). The book is believed by some to have been written in 1461, by others in 1464. An acrostic found in the poem gives the date of composition. Bartsch (*Germanische Studien*, ii, 305) fixes the date at 1461; Singer at 1464. Heinrich Steinhöwel, the author, was born in 1412 at Weil. He visited Italy, studied medicine at Padua, and practiced his profession in Esslingen. He died at Ulm in 1483.[4] He was a translator, and published a rendering of Petrarch's Latin version of Boccaccio's *Griseldis*. He also translated Boccaccio's *De Claris Mulieribus*, which was printed by Johann Zainer von Reutlingen, 1473, and reprinted by Anton Sorg, 1479. It is also published by Karl Drescher in Bibliothek des Litt. Vereins in Stuttgart, Vol. 205.

This Augsburg *Apollonius* was reprinted by Joh. Bemler in 1476; Anth. Sorg, 1479 and 1480; at Ulm, 1495; again at Ulm, by Hans Zeiner, 1499, and at Augsburg, by H. Froschauer, 1516. It is the same book that bears the title *Von Künig Appolonio. Eyn schöne und lustige Histori nit mynders nutzlich dann kurtzweilig zu*

---

[1] "Griseldis. Apollonius von Tyrus. Aus Handschriften herausgegeben von Carl Schröder, Leipzig, T. O. Weigel, 1873." This is Heft ii, Pt. 5, of *Mittheilungen der deutschen Gesellschaft zur Erforschung vaterländischer Sprache und Altertümer in Leipzig*, pp. 85–131.

[2] Haupt speaks of another MS. in Breslau (*Opuscula*, iii, 28).

[3] A conjecture of Schröder, adopted by Penon.

[4] Paul, *Grundriss*, ii, i, 403 (article by F. Vogt), Wackernagel-Martin, *Gesch. der deut. Lit.*, S. 454, A. 234, gives 1420 as the year of birth. For the biography of Steinhöwel, see Keller Litteratur Verein, 51: 673, and Wunderlich, *St. und das Decameron*, 1889.

lesen. . . . . Vor Jarn durch D. Gotfrid von Viterb. im latein beschrieben. Nachmaln inns Teutsch verwendet. 1540, Augsburg, H. Steyner. And again, *Ein schöne History Appolonius, wie er von seinem Landt vertrieben, schiffbruch und mancherlei unglück erlitten, und doch endlich durch Glück wider in sein Landt kommen ist. Augsburg, 1556.*[1]

Steinhöwel fixes the date of the reign of Apollonius with great care :—

"Das ist ain Vorred in die hystorie des Küniges Appolonii das man wisse wen er geregnieret hab."

He arrives at the proper period by a gradual descent from Eden and the flood to the fall of Troy, the building of Rome, the division of the world after the death of Alexander, etc.

There is a mild pathos and humor in the author's personal reminiscence and profession :

"Ett ichs geton sumnus bass
Ain rapp singt all zeit cras cras cras,
In solichem gsang han ich gelebt
Nun und viertzig iar in Hoffnung gewebt
Ruwiger als vergangen Zeitt
Ich gedacht allweg bis morn beitt
Cumst du dannocht gelernen wol
Usz dem bleib ich an künsten vol."

After settling the time of the reign, the translator enters upon a description of the incest, in which he closely resembles Wynkyn de Worde (1510). Apollonius guesses the king's riddle, whereupon Antiochus lies angrily saying that his solution "in no way answers the question." When Apollonius reaches home he looks in his books and finds that in all things he has answered the king aright. He departs from Tyre in the middle hour of the night, unknown to all the citizens. When his flight is discovered there is great sadness, no dancing, no marriages—"alle tabernen waren beschlossen." Elemitus (Hellenicus) is the bearer of the warning to Apollonius. The prince relieves the distress of Tarsus with 100,000 measures of wheat, declines compensation, and the grateful burghers erect a statue of him with corn in his right hand and his left foot spurning gold. The king's daughter in this version is called Cleopatra;[2]

---

[1] Grässe, *Trésor de livres rares et précieux*, i, 165; Grässe, *Lehrbuch einer allgemeinen Literärgeschichte*, ii, 3: 459, 460.

[2] She is called "Camilla" in two Latin MSS., Vienna 362 and Vienna 510, (sæc xiii), and the daughter of Antiochus is called in them Creusa.

she is instructed in music by Apollonius, to whom she says, "You are called Apollonius; it were better to call you Apollo." As they walk by the seashore a ship approaches land. "We are from Tyre," says the captain. "A land well known to me," replies Apollonius. "Do you know Apollonius?" queries the captain, and Apollonius replies, "Ja, ich kenn im so wol als mich selber." Whereupon the king says, "Yesterday he was like me, to-day he is a lord of the earth; before this he has been my son, now I am less than he." The rest of the story follows closely the outlines of the *Historia*.

Ain Hübsche Hystori von dem Künig Appolonius [with woodcuts], Augspurg, 1552; Hans Zimmerman. This is a reprint with slight changes of the edition of 1471. The woodcuts are curious: on the title page is a picture of Alexander the Great, and the other illustrations represent the king issuing from his daughter's chamber; the king stating the riddle to the princely suitors; Apollonius setting forth on his voyage homeward from Antioch; the return of Taliarchus from an unsuccessful journey, and reporting to the king the flight of Apollonius; the landing of Apollonius in Tarsus; his boats laden with bags of corn; relieving the famine; shipwreck; fisherman receiving Apollonius; Apollonius in the bath at Pentapolis; at table with Archistrates and his daughter; the king's daughter playing on the harp; the love-sick daughter visited by her father; the king joining the hands of the lovers; the burning of Antiochus and his daughter; the casting overboard of the chest; Cerimon finding the chest; Stranguillio and Dionysia with the infant Tharsia; death of Ligorides; Philomancia and Tharsia in school; pirates escaping with Tharsia; Tharsia sold to the Gemein Frawenhausz; arrival of Apollonius; interview of Athenagoras and Tharsia; Apollonius, Tharsia and her husband sail for Ephesus; Apollonius recognizes "Cleopatra," his wife; journey in state to Antioch; rewarding the fisherman. The whole eventful history ends with this rustic clapping of hands and sequent prayer:

> "Damit sag ich Lob, Danck und Eer
> Alpha und ort widerkeer
> Pillich wann er hat gegeben
> Appolonius strenges Leben
>   Klar zu Teutschem ausz Latein
> Etlicher alten Hystoryen.
> Mit namen liesz ich nicht verderben
> Doctor Gotfrides von Viterben

Obersters Cronickschreyben
Mit dem die Kirch auch wil beleyben
Jesus Christ Helff uns Gnad erwerben
Nit lasz uns in den Sinden sterben
Ewig das wir sind behalten
Mit allen Rainen Jungen Alten."

Hie endet sich die Hystory des Künigs Appolonius. Getruckt und Vollendt in diser Kayserlichen uund Loblichen Stat Augspurg. Durch Hausen Zimmerman, Anno MDLII.

Scandinavian Versions.

Eine schöne unde kortwylige Historia vam Könige Appollonio wo he van Landt unde Lüden vordreven unde vorjaget . . . . unde doch thom lesten wedder in syn Lundt gekamen ys. Hamborch, 1601, octavo. This version by Herman Moller, which follows the Augsburg of 1552, corresponds to the Danish folkbook entitled, *En dejlik og skjön Historie om Kong Apollonio i hvilken Lykkens Hjul og Verdens Ustadighed beskrives; lystig og fornöjelig at læse og höre.* Kjobenhavn, udi dette Aar, 1627. (The beautiful and charming history of King Apollonius, in which the wheel of fortune and the mutability of life are described; jolly and novel to read and hear.) A copy of this scarce book is in the Karen Brahes Library in Odensee (Finland). Another edition is dated 1731 (see Grundtvig, *Om Nordensgamle Literatur*, Copenhagen, 1867, p. 5. It is also quoted in Rasmus Nyerup, *Almindelig Morskabslæsning*, Copenhagen, 1816, p. 168, 169. Cf. Haupt, *Opuscula*, iii, 29).

The same version (corresponding to the *Gesta Romanorum* and containing two riddles—unda and navis) was printed at Copenhagen, 1660, and a translation of it (Icelandic) is "Additional MS. 4857" in the British Museum. The title, identical in meaning with the Danish, is "Ein Agiæt og fogur Historia wmm Kong Apollonius i huorre luckunnar og veralldarin nar östodugleike skrifast miog nitsamleg ad heira og lesa Prented i Kaupmannahafn, af Christen Jenssyne Wering Acad. og Bökpryckiara, anno 1660, Sagann af Apollonius Konunge til Tyro," January 7, 1670.

"Additional MS." 4864 (British Museum) is a modified version of the former.

The Apollonius is also to be found in Rafn's translation of the Didrig saga, *Nordiske Fortids Sagær efter den udgivne islandske* *elser gamle nordiske Grundskrift*, oversatte of C. G. Rafn, P. D. Tredie Bind, Kjobenhavn, 1830. The Apollonius is found on pages 3, 231–238, 242–247, 252–254, 257.

The Swedish version bears the title "*Apollonii Konungens af Tyro Historia uti hwilken Lyckornes Hjul, och thenna Werldenes Ostadighet beskrifwes: Med Lustiga Fragor och Gator beprydd och Nu efter Mangas astundan pa nytt förfärdigat utgifwen af Andrea Johan Arosiandro Tryckt*," (*The History of King Apollonius of Tyre*, in which fortune's wheel and the world's unsteadiness are described, with merry questions and riddles, and now after many requests, revised and published anew). It was issued in 1732, and again in 1747. The last three pages of the 1747 edition of this little book are taken up with a tavern song, "En wisa som lämpas kan til Historien om en man som sin Hustru bortsälde til Röfware, och huru hon blifwit frälst ifran döden" (A song which may be applied to the history of a man who sold his wife to a robber, and how she was rescued from death). The edition 1747[1] is not recorded in Bäckström, whose Index records editions of 1642, 1732 and 1835.

The Swedish version is derived from the *Gesta Romanorum* (see parallelisms in Singer, pp. 130–132). There are also points of resemblance with Steinhöwel which induced Haupt to believe that the Danish and Swedish books were both indebted to that text, particularly as the "wheel of fortune" plays so important a part in Steinhöwel.

DANISH BALLAD.

In 1880, Rudolph Klein's *Kort Udsigt over det philologisk-historiske Samfunds Virksomhed*, 1878–1880 (Copenhagen), contained a brief of a paper presented by Kr. Nyrop upon "De Historia Apollonii regis Tyri," in which a singular ballad of the thirteenth century relating to the shipwreck of Apollonius was described. The ballad had been referred to by Haupt (*Opuscula*, iii, 29), a fact of which Nyrop appeared to be ignorant, and it was published in Svend Grundtvig, *Danmarks gamle Folkeviser*, ii, 88.

The ballad is limited to a single episode, the shipwreck of Apollonius. Nyrop compared it with the *Chanson* of Jourdain de Blaivies. As the ship sinks, Apollonius, according to the ballad, is thrown upon a rock, but retains his lyre upon which he plays. Some fishermen, attracted by the sound, draw near. They say: "We have fished here eighteen years, and lived in darkness and light; now is come hither a sea-demon (a haffuetrold) who will spoil our fishing."

---

[1] I am indebted for my examination of this book at the University of Lund to my friend, Prof. Hjelmérus.

Apollonius says: "I am no sea-demon; I am a poor shipwrecked man; may God bring me safe to land." "Are you a Christian?" ask the fishers, "and can you pray to Jesus, the Son of Mary, who died for us all?" He raises his right hand, makes the sign of the cross and cries: "Help me now, Jesus, the Son of Mary, who died to save me."

In the old French poem the shipwrecked Jourdain has no lyre whereon to play, but he wails so loud that the fishers hear him. The poem proceeds:

> Si com Jordains se gaimentoit ainsiz,
> Garde par mer, voit un home venir
> En un batel qui moult estoit petis,
> Et quiert poissons, c'est li ars, dont il vit;
> Et li peschierres tout droit a lui s'en vint,
> Et li demande: "Va, quel chose iez tu ci?
> Se iez fantosmes, de deu te contredi,
> Que de parler n'aiez vers moi loisir."
> Et dist Jordains: "Se dex m'ait, nenil;
> Ainz sui uns anfes d'autre terre chaitis.
> Parmi la mer m'en venoie un juesdi
> A grant compaingne de chevaliers gentiz;
> Mais Sarrazin nouz orent assaillis,
> Vos gens ocistrent et s'en remest des vis," etc.
> (Jourdain de Blaivies, ed. Hofmann, p. 142, lines 1296–1309).

The resemblance here is more than accidental. The circumstance is found in neither the Latin *Historia* nor any of the other versions. Riese reads, "Et prosternens se illius ad pedes effusis lacrimis ait 'miserere mei, quicumque es, succurre naufrago et egeno, non humilibus natalibus genito! Et ut scias, cui miserearis, ego sum Tyrius Apollonius,'" etc. Nyrop's conclusion was that in Denmark as in France there had been two diverse redactions, and that the Danish folks-book, a translation, as has been said, of the Augsburg folks-book, had no connection whatever with Jourdain de Blaivies.

Dutch Versions.

The story of Apollonius entered the Netherlands through the *Gesta Romanorum*, of the Dutch translation of which—*Die Gesten of gheschienissen van Romen*—there are three editions—Gouda, 1481, Delft, 1483, and Zwolle, 1484 (cf. Campbell, *Annales de la Typographie Neerlandaise au XVe Siècle*, 226, 227).

The first popular version of the story apart from the *Gesta*, but derived from it, appeared in Delft in 1493, entitled *Die schoone ende die Suuerlicke historie van Appollonius van Thyro.* The book is excessively rare; only two copies, I believe, are known to exist—one is in the Bibliothèque National of Paris,[1] the other is in the library of the Zeeland Society of Sciences at Middelburg (Zeeuwsch Genootschap der Wetenschappen).[2] The directors of the Society permitted Dr. Georg Penon to borrow the little book (bœkje) and to copy it. His account of it is in his *Bijdragen tot de Geschiedenis der Nederlandsche Letterkunde*, Groningen, 1880, pp. 109–113, and the book itself is reprinted in the same work (123–182). Penon follows the original almost literally and indicates in footnotes the passages in which it differs from the *Gesta*,[3] and occasionally appends the reading of the Latin *Historia*, in Riese's edition.

The resemblance of the folks-book to the *Gesta* is so marked that Penon believes the former to have been a version made by a bookseller who was impressed with the story as he found it in the *Gesta* and who believed that it would make a popular book if printed independently. Penon comments indignantly upon Grässe's "guess" that the Netherland book was a translation from the German of Steinhöwel. "Woher das holländische Volksbuch ist, ob aus dem Deutschen, was am Wahrscheinlichsten ist, oder unmittelbar aus dem Lateinischen, ist noch nicht entschieden," says Grässe (*Lehrbuch*, ii, 3, 458), to which Penon replies, "*Is nog niet beslist!* Hoe komt de man bij zoo'n praatje? Wie zou beslissen? Gewis alleen hij, die het Nederlandsche Volksboek gelezen had. En Grässe heeft het boek gewis nooit gezien."[1] Following Grässe's venturesome conjecture, the Dutch writer, A. Winkler Prins (*Geillustreerde Encyclopædie*, ii, 91), declares the folks-book to have been made after the German model: "de Nederlandsche overzetting vermoedelijk naar eene Duitsche."

---

[1] The book was formerly in the library of the Hague, but was taken to Paris in 1811 (cf. Campbell, *Annales*, p. 267).

[2] The book is described by Campbell, *Annales*, No. 965, Hain *Repertorium Bibliographicum*, 1303, and by Grässe and Brunet, but it was never seen by the two latter. Even the learned librarian at the Hague (L. Ph. C. van den Bergh) says in his *Nederlandsche Volksromans*, p. 158, that this book is known to him only by name—"alleen bij naam kent."

[3] The copy of the *Gesta* used by Penon for comparison was the edition of Johannes de Westfalia, 1484.

The adventures of Apollonius were dramatized in Holland and published in 1634, under the title, "*Twee Tragi-comedien in prosa, d' Eene van Appollonius, Prince van Tyro, Ende d' ander van den selven, ende van Tharsia syn Dochter. Wesende niet alleen lustigh ende vermakelijck om lesen: maer oock vorderlijch om weten, hoe men hem in voorspoet ende teghenspoet behoort te draghen. Nu van nieus oversien ende verbetert door P. B. C. ins' Graven-hage, Ghedruckt by Aert Meuris, Boeck-verkooper woonende inde Papestraet, in den Bijbel, Anno 1634.*" The first part has eighty-four pages, the second part eighty pages without separate title[2] and with continuous pagination. It is possible that the work was printed before 1634 and that the words "nu van nieus oversien ende verbetert" refer to the prior publication. An imprint of 1617 (The Hague) is mentioned in the *Biographisch Woordenboek* of Huberts, Elberts and van den Branden, p. 48, but I know nothing of the existence of the book.

The *Twee Tragi-comedien* was written by Pieter Bor Christiaensz. In the Preface, addressed to his nephew, "the respectable, pious, and intelligent" ["den Eersamen, Vromen, ende verstandighen"] "Pietor Bor Jansz., Secretaris van den Gherechte der Stadt Utrecht," the author tells how he came to write the play; he had read, he says, in "seker oudt versuft Boeck." The book was most likely the *Gesta* and not the folks-book of 1493. Dr. Penon discovered that in the play Apollonius sells his wheat to the people of Tarsus for *acht penningen* a bushel, which corresponds to the *Gesta's acht placken*, but not to the folks-book's *vier hellinks*. Moreover, in the play, as in the *Gesta*, Lucina gives to Apollonius a present of ten maidens ("tien Meyskens"), of which gift there is no reference in the folks-book.

---

[1] Penon, *Bijdragen*, p. 112.

[2] Penon observes that the *Catalogue of the Library of the Society of Netherland Literature at Leiden* (*Catalogus der Bibliotheek van de Maatschappij der Nederlandsche Letterkunde te Leiden, Derde Gedeelte, Nederlandsch Tooneel* [stage]), 1877, p. xxvii, cites this work under two titles.

The dramatist evidently found himself embarrassed by the variety of adventure in his story, and, while it is unlikely that he was familiar with Shakespeare's *Pericles*, he resorts to the introduction of characters who are strangers to the plot but who by their conversation account for the many incidents for which the action of the drama has no room or time—an expedient not unlike the introduction of Gower as chorus. Bor lived at the time of the rhetorical guilds and he introduces upon the stage characters after the manner of the *rederijkersperiode*, as, for example, *Fama*, *Verdriet en Blyschap* (Chagrin and Gayety), *Verneem-al en Veel-snaps* (Eavesdropper and Gossip). Bor's verse is monotonous and drowsy, and, as the Dutch proverb says, "hangs together like dry sand."

There is yet another drama in the literature of Holland—*Appollonius, Koningh van Tyrus, Treuer-spel* (Amsterdam, Jacob Vinckel, 1662)—which has the name but not the story of our Apollonius. It is the performance of the cruelties of a mad king, and while in the *dramatis personæ* we find the familiar names Apollonius, Licoris, Stragulio, Archistratus, and Antiochus, yet the characters are changed, and Antiochus is a mild and benevolent king of Syria, and Apollonius is a murdering madman. The work is dedicated to a woman well known in the history of Netherland literature, Anna van Hoorn (wife of Cornelis van Vlooswyck), and the dedicator declares that the play is none of his invention, but the work of another hand, left in his care by the real author, who had departed on a journey. D. Lingelbach, who writes the dedication or inscription (Opdracht), concludes, "Ontfangh dan, Hooghwaerde Vrouwe, 't geen ick UE opdrage: niet als eygen, maer als een werck dat vry hooger draeft" ("receive, estimable lady, this work, which I dedicate to you, not as mine, but as a work which *trots much higher*"). The dedication is dated "Amsterdam, den 4 van Grasmaent [April 4], Anno 1662." Maugre this denial of authorship the work is nevertheless ascribed to Lingelbach by Grässe (*Tresor*, i, 166), Schröder (*Griseldis*, lxxix), and in the Catalogue of the Library of the Maatschappij der Neder. Letterkunde te Leiden (iii, No. 432).

Still another Dutch version is *De Wonderlyke Gevallen van Apollonius van Tyr*, T'Amsterdam, by Isaac Trojel, Boeckverkoper op 't Rokkin, in M. Antonius (*i. e.*, "at the sign of Marcus Antonius"), 1710. The little work is dedicated to Jan Munter Cornelis, "Geheimschryver van de vermaerde Koopstad Amsterdam" (clerk of the celebrated commercial city Amsterdam). Trojel says in his dedication that he has sought to be brief in the narrative of adventures, not diffuse (wytlopig), and that he has translated the story from the Latin *Historia*, and mentions Velser's edition. Penon's attention, after the publication of his work, was called to this rare book by Mr. A. van Wessem, of Tiel (a judge of that city), a possessor of a copy.

HUNGARIAN VERSIONS.

An Hungarian version of the sixteenth century I have seen at the British Museum, but as my attainments in Magyar are of the same extent as De Quincey's in the Malay, I am unable to establish the history of it. I quote the title: "*Szép jeles Historia egy Apollonius nevủ Kiraly Fiurol, Miképpen ỏ egy Mefének*, meg-fejtéfe miatt el-bujdosván *à* tengeren valo hajo kazasban minden javait el-vesz tette, eś halasz ruhában Altistrates Királ ynak udvarába jutott: Annak utanna sok viszontagsaginak végén, a szerencsenek jobb szarnyara fel vetetvin, Kiraly allapottyahoz illö csendesseggel megkoronaztatott. Most ujjobban ki-nyomtattatott es rendes rhythmusokkal meg-ekesitetett. Budan. Nyomtat. Katalin Landererne Betuivel."[1] On the reverse of the title is, "Adagio Virorum Sapientium, In via virtute nulla est via; tamen itur per aspera ad prospera; post nubila phoebus."

A copy in the Hungarian National Museum in Buda-Pesth is said, in the last stanza of the work, to have been written in 1588. The copy lacks a title-page. It is bound up with another book, and written in the volume are the words "Irta Bogáti F. Miklos nyom. Kolozsvar, 1591," that is, written by M. F. Bogati, printed at Kolozsvar, 1591. Miklos Fazekas Bogáthi was a Unitarian preacher who died 1592 (Singer gives from Simonyi an account of his life and writings). A second Miklos (Nicholas) Bogathi, sometimes confounded with the first, died in 1603. It is not certain that the work in question was written by Bogathi; only it is bound with a book which is certainly by him, entitled: "Ez világi nagy soc zür zavarrol valo Ének" (a song of the great tangle of the world).

---

[1] A beautiful and excellent history of Apollonius, a king's son; how he, after solving a riddle, wandered away; how in sailing about on the ocean he lost all his possessions, and in sailor's clothes arrived at the court of King Altistrates. At the end of his many adventures, having been taken up on a better wing of fortune, he was crowned with a silence befitting his state as a king. Now, again, reprinted and embellished with regular rhyme, in Buda. Printed with Cataline Landerer's types.

The title of the book, according to Szabo Károly, is *Szep Chronica miképpen az Apollonius nevö Királyfi egy Mesének meg feytesevegett elbujdosuán, Az Tengeren mindeneket eluesztuén Halasz ruhaban Altistrates Kiraly udvarában juta, melynec Leanya a szep Lucina aszszony az Kiraly fit meg szeretuen hozza mene. Es miképpen az Apollonius az Kiraly ságra haza menuen, az Tengeren Feleseget es Leányát el veszté és miképpen oket soc eszledo mulua nagy orommel egésségben találá. Most vyionnan, az Lucretia notayára Magyar njelvre forditatot, és meg nyomtattatot, Colosvárat az oh várban* 1591, *Esztendoben* (A pretty story concerning Prince Apollonius who having solved a riddle was forced to wander. Having lost everything at sea, he arrived in fisher's garb at the court of King Altistrates, whose daughter, the beautiful Lucina, fell in love with him and married him; and how Apollonius returning home across the ocean lost his wife and daughter, and how, after many years, he found them again in good health. Now again, after the aria of Lucretia, translated into Hungarian, and printed in the year 1591).

There are other publications of the story in 1722, 1741, 1751; five editions of the eighteenth and nineteenth centuries without hint of place or date, but all probably printed at Buda-Pesth. The 1751 copy has for title, "Igen szep chronica Apollonius nevü Kiraly firol, miképpen egy mesének meg-fejteseért elbujdosván az tengeren mindeneket el vesztvén. Halász ruhában Altistrátus Király Udvarában juta. . . . . Nota: sok erös vitézek, bölksek." Esler Marton, 1751 (A beautiful story of a Prince Apollonius who having solved a riddle wanders abroad; having lost all upon the sea, he arrives, clad as a fisher, at the court of King Altistrates. . . . . Song: Many strong knights, wise ones, etc. Esler Martin, 1751).

The poem consists of 202 stanzas of nine lines each, of which the third, sixth and ninth lines rhyme, and the others are without rhyme. The source of the story is the *Gesta Romanorum.*

ITALIAN VERSIONS.

A MS. of the middle of the fourteenth century is preserved in the Biblioteca Nazionale of Turin. The story occupies the entire Codex N.V. 6 (Pasini, cci. l. 1. 97). It consists of twenty-eight leaves and is well written in Gothic characters. Thirty-five miniatures illustrate the MS. The work has been printed (at Bellinzona) in a limited edition (100 copies), edited by Carlo Salvioni (*La Storia di Apollonio di Tiro, Versione Tosco-Veneziana, della meta del Sec. xiv edita da Carlo Salvioni*). The editor detects the presence in the MS. of the hand of a second scribe whose work of correction follows close upon the labor of the original amanuensis. The second writer was probably a Veronese and his changes give to the text a more Tuscan aspect.[1] Salvioni, with the aid of Prof. Count Carlo Cipolla, has succeeded in reproducing the original text.

The oldest Italian edition is *La Storia di Apollonio di Tiro in ottava rima*, Venez, 1486; reprinted in 1489, 1490, 1492, 1520, 1535, 1555, 1560, 1598, 1610, 1629, 1679 and 1709. The edition of 1492 is entitled "*Historia di Apolonio di Tiro reformata per Paulo de Taegia in l'anno 1492 nel mese settembre a contemplazione della magnifica Madona S. da Ferrara e poi per piacer del popolo,*" *Milan, 1492* (cf. Paitoni, *Bibl. degli Volgarizz*, i, 79; and Leone del Prete: *Storia di Apoll.*, etc., Lucca, 1861).

An edition said to have been made in Florence in 1580 is adorned with wood cuts. It contains six cantos and thirty-two pages. It is devout, each canto beginning with an invocation to Jesus Christ, the Father of Mercies. It is entitled *Historia d'Apollonio de Tiro nuovamento Ristampota.*

It ends with

"Mi fu recato in questa lingua prima
  perche ciascum si bella storia intenda
et io à voi ve l'ho contato in rima
  perche diletto ciasche dun ne prenda
signor c'havete dal pie alta cima
  da me udita la bella leggenda
io prego Dio, che á tutti sia in acoto
  Al vostro honor questo libro é finito."

SPANISH VERSIONS.

In the library of the Escurial there is a Spanish MS. (iii, k, 4to) containing three compositions: (1) "Libro de Apolonio," (2) "Vida de Santa Maria Egipciaqua," (3) "Adoracion de los Reyes."[1] It is a quarto codex, on parchment, and has eighty leaves well and clearly written. It has generally been believed to belong to the thirteenth or fourteenth century, and the nameless author or "arranger" is believed to have been contemporary with the author of the *Poema del Cid*[2] (1135–1175). The MS. was first published by its discoverer, Pedro José Pidal, in 1844. It is in Sanchez's *Coleccion de poetas Castellanos anteriores al siglo decimo quinto*, which is a collection found in *Biblioteca de Autores Españoles desde la formacion del lenguaje hasta nuestros dias* (tomo quincuagesimosetimo [57] Madrid, 1864.[3] The "libre de Apollonio" of this publication occupies pp. 283–305, and has a preliminary note by Pidal (pp. xxxvi–xli).

---

[1] Notice *oio* for *olio* (oil), and *perdu* for *perso* (lost), *alto* for *olto* (high) and *tieni* for *tienis* (hold).

It is written in stanzas of four verses, all terminating with the same rhyme. The verses contain fourteen syllables and bear evidence of Provençal origin. The metre was a novelty[4] and was "properly regarded by the author as his chief distinction," and he implores the divine aid in his new experiment while he essays his six hundred stanzas:

> " *Componer un romance de nueva mæstria,*
> Del buen rey Apolonio e de sa cortesia,
> El rey Apolonio de Tiro natural,
> Que porlas aventuras visto grant tenporal,
> Como perdio la fija e la mujer capdal
> Como las cobro amas, ca les fué muy leyal."

"I will write a romance (story) in the new mastery (*method*)." *Nueva maestria* no doubt refers to the form of the stanza and to its rhyme. George Ticknor says "The merit of the poem is small. It contains occasional notices of the manners of the age when it was produced—among the rest, some sketches of a female *jongleur*, of the class soon afterwards severely denounced in the laws of Alfonso the Wise, that are curious and interesting. Its chief attraction, however, is its story, and this, unhappily, is no original" (*History of Spanish Literature*, 1st ed., 1849, Vol. i, p. 25). The female *jongleur* or *juglaresa* mentioned in the *Apolonio* is the primitive strolling actress. Alfonso in *Las siete Partidas* denounces the class as infamous.

---

[1] Or, *Libre dels Tres Reyes dorient.*

[2] According to Fitzmaurice-Kelly, the most recent historian of Spanish literature, the narrator of the Apollonius story was "probably a native of Aragon" (*Spanish Literature*, 1898).

[3] This is the admirable collection of Spanish classics in 79 vols. by Manuel Rivadeneyra.

[4] F. Wolf, *Blätter für literarische Unterhaltung*, Jahrgang 1850, zweiter Band, No. 232.

The Spanish text obviously rests upon the French or Provençal, and in turn inspired a production of the *aljamia* or Spanish-Arabic literature. The *Maid of Arcayona* belongs to the *textos aljamiados* and is an outgrowth of the *Apolonio.*[1]

The Spanish *Apolonio* has a perfervid Christian tone. Christian piety and honor have been breathed into the ancient pagan story. It is the voice of an angel that summons Apollonius to Ephesus, where his wife is the *abbess of a convent!*

A later Spanish version is found in the *Patrañuelo* of Juan de Timoneda (1576). Timoneda was a book-seller of Valencia, who printed the *pasos* (dramatic interludes) of Lope de Rueda (cf. *Deleitoso Compendio,* 1567, and *Registro de Representantes,* 1570). He was an early writer of Spanish tales, or rather an arranger (for he had little originality) of previously existing plays and narratives. The very popular picaresque novel, *Lazarillo de Tormes,* had excited a desire for stories of wit, intrigue and adventure, which Timoneda attempted to satisfy with a collection of twenty-two traditional tales (*Patrañuelo,* or story-teller). His version of the *Apollonius* he derived from the *Gesta Romanorum* (cf. Brunet, *La France littéraire au XVe siècle,* p. 12). It only remains to note that the character of Tarsiana in the early Spanish text appears to be the type of Preciosa, the heroine of Cervantes' *Gitanilla,* and of Weber's opera.[2]

PROVENÇAL AND FRENCH VERSIONS.

Wilhelm Cloetta, *Abfassung und Ueberlieferung des Poeme Moral,* Erlangen, 1884, may be consulted for the bibliography of the Apollonius saga among the troubadours. Numerous references also occur in Raynouard, *Poesias d. Troubadours,* ii, 301. The allusions to the story in the songs of the troubadours, and the frequent Provençal words and phrases in the Spanish MS. point to a very early appearance of the story in France (cf. Fauriel, *Histoire de la Poésie Provençale,* iii (1846), 486, 487).

---

[1] Castilian written in the Arabic alphabet was called *aljamia* (*i.e.,* foreign), the original name of the imperfect Latin spoken by the Muzárabes. The *Poema de Yusuf* belongs to the literature thus begotten.

[2] Fitzmaurice-Kelly, *Spanish Literature,* p. 54.

Arnaud de Marsan a poet of Provence, about 1642, sings :

"d'Apollonius de Tyr
Sapchatz contar e dire
Com el fos perilhat," etc.

Toward the end of the thirteenth century the Provençal romance of *Flamenca* contains, among other anonymous histories, *l'autre cantava d'Apolloine com si retene Tyr de Sidoine.* It is a narrative poem in octosyllabic couplets, edited from the unique MS. at Carcassonne by Paul Meyer and translated into modern French (Paris, 1865) (see Francis Hueffer, *The Troubadours*, 1878, p. 15).

The story appears to have existed in the poetry of the troubadours in the south of France, if we suppose Alphonse le Savant to refer to the French *Apollonius.*

"Y sin gobierno ni jarcia
Me porné por alta mar
Que asi ficiera Apolonio
Y yo faré otro que tal."

And in the north of France it passed, as we have already seen, into the vast orbit of the Carlovingian cycle.

The old French prose version is contained in a little volume printed at Geneva in 1482 (?). It is entitled "*Apollin roy de Thire. Cy commence la cronicque et hystoire de Appollin roy de thir et premierement danthiogus et de sa fille comment par luxure il violla sa fille et comment il mourut meschamment par la fouldre qui loccit.*" Of this rare *incunabulum*, only two copies, so far as I know, are known to exist; one was purchased at the sale of Louis Philippe's library in 1852, for about 1800 francs; the other is at Sitten, in the library of the family of Lavallaz.

A little later was published "*Plaisant et agréable histoire d'Appollonius prince de Thyr en Affrique et Roi d'Antioch traduite par Gilles Corrozet, en ses jeune ans*" (Paris, 1530).

The story is found in Boisteau and Belleforest, *Histoires tragiques*, Rouen, 1604, 7th vol., p. 113; and in the eighteenth century it is entitled *Les Aventures d'Apollonius de Thyr, par A. B.* (Ant. le Brun), Paris, 1710; Rotterdam, 1718 (?); Paris, 1797 (cf. *Nouvelle Bibl. d. Rom.* Tom. i, p. 1).

It appears in classic French literature in Corneille's *Theodore, Vierge et Martyre*, the scene of which is laid in Antioch in the reign of Diocletian.

Duplessis' catalogue cites a MS. in the library at Chartres (No. 419), "Lystoire de Apollonius qui apres les pestilences et fortunes quil ot en merset ailleurs, fust roy de Antioche" (Duplessis, *Catalog. de la bibl. de Chartres*, Chartres, 1840).

I feel bound to mention the French translation (*Apollonius de Tyr*), by J. d'Avenel, Paris, Mortain, 1857. The translator says (p. 3, footnote), "Notre traduction d'Apollonius est, sauf erreur, la première qui ait paru dans notre langue; nous reclamons donc pour elle l'indulgence du lecteur." It is milk for babes, all the strong passages of the original carefully expunged.

A manuscript of the French prose romance is in the British Museum (Royal 20, C. ii). It is of the fifteenth century, on vellum; the preceding part of the MS. contains the prose romance of Cleriadus and Meliadice. The general heading reads: "Cy commence la cronique et histoire des mervuilleuses aventures de Appolin Roy de Thir." It concludes: "Touttesfois tant comme il vesquit il fust Roy dantioce et de thir et de la terre des penthapolis et de citrianne et de tarcye et en sou tempz les tint en bonne paix. Puis fist escripre ses adventures et le mist en vi lieux dont lun fist mettre en la terre des effes [Ephesians] Et laultre au temple de dyane Et laultre en anthioce Et laultre en cytrianne [cyrene] Et laultre en tarcye Et laultre a thir Ainsi est finee listore et cronique de appolin de Thir."[1]

A French translation of the fifteenth century, *Le Violier des histoires Romaines*, is republished in the *Bibliothèque Elzévirienne*, under the title "Le Violier des histoires Romaines, Ancienne traduction française des Gesta Romanorum, Nouvelle édition, revue et annotée, Par M. G. Brunet, Paris, 1858 (chapter 125). It resembles the *Gesta Romanorum*, but occasionally points to another source. Singer cites (p. 108) several passages in which the text agrees rather with the *Historia* and with Steinhöwel than with the *Gesta*.

MODERN GREEK VERSIONS.

As the Greek original of the saga is lost, peculiar interest attaches to the medieval Greek versions. The hero, after having traveled so far from the East, returns in the circle of romance and appears twice in a Greek garb. "Damals kehrte die Erzählung vom Abendlande nach dem griechischen Osten zurück, wo längst jede Spur des alten Originalwerks verloren gegangen war" (Krumbacher, "Byzantinischen Litteraturgeschichte," in I. Müller's *Handbuch der Clas. Altertums-Wissenschaft*, ix, pt. i, p. 434.) Both the Greek versions are metrical. The older one is apparently of the end of the fourteenth or the beginning of the fifteenth century. It has 857 unrhymed verses. It is in a Paris MS. (Codex Paris. grec 390), described in the catalogue: "Narratio de Apollonio Tyrio e latina lingua in græcam conversa; hic codex decimo quinto sæculo exaratus videtur." It begins on fol. 149*b* and finishes 173*b* (see Chauvin, *les Roman. Grec.*, pp. 175–182). It is entitled *Μεταγλώττισμα ἀπὸ Λατινικὸν εἰς 'Ρωμαϊκὸν, Διήγησις πολυπαθοῦς 'Απολλωνίου τοῦ τύρου.* It is compared with the Latin version in a study by M. Gidel ("Étude sur Apollonius de Tyr," in *Literarisches Centralblatt*, 1871, No. 34, p. 851). Much Christian comment is introduced into the pagan story. The most complete studies of the Greek versions have been made by Wilhelm Wagner, in two separate publications. His first book is "*Medieval Greek Texts. Being a Collection of the Earliest Compositions in Vulgar Greek, Prior to the Year 1500. Edited, with Prolegomena and Critical Notes, by Wilhelm Wagner. Part i. London. Published for the Philological Society, by Asher & Co., 1870.*" His second book is "*Carmina Græca medii ævi.* Edidit Gulielmus Wagner, Lipsiæ, 1874." See also *Étude sur Apol. d. Tyr. Roman écrit en Grec et en vers politiques d'après une version Latine*, M. C. Gidel.

---

[1] Another MS. which Singer has collated is in the Imperial Library at Vienna (No. 3428).

Wagner believes the MS. of the earliest Greek text to belong to the early fifteenth century, but Omant (the keeper of the MSS. in the Paris Library) contends that it is not older than the sixteenth. For the sources from which the MS. is derived, see L. Traube, *Neues Archiv d. Gesellschaft für ältere deutsche Geschichtskunde*, v, 10 (1884), p. 382.

The second Greek version belongs to the end of the fifteenth century. It is a much fuller narrative than the first text and contains 1894 rhymed verses (1838 in the Venice edition of 1778). It appears in some editions (for it was a popular work and often reprinted) to have been made by Gabriel Kontianos; in others by "Konstantin Temenos"[1] (cf. Legrand, *Bibliogr. hell.* i (1885), 290). It is entitled *Διήγησις ὡραιοτάτη ἀπολλωνίου τοῦ ἐν τύρῳ. 'Ριμάδα*, in Venezia, per Messer Stefano da Sabio ad instantia di M. D'Amian di Santa Maria, 1534. Brunet mentions other editions from the Venetian press in 1553 (Christ. di Zanetti), 1603, 1642 and 1696 (see Haupt, *Opuscula*, iii, 27, and B. Schmidt, *Griechische Märchen Sagen und Volkslieder*, Leipzig, 1877, p. 7, and Th. Grässe, *Lehrbuch einer allgemeinen Literärgeschichte*, ii (1842), 457–460, and K. Gœdecke, *Grundriss zur Geschichte der deutschen Dichtung*, I (1884), 367).

---

[1] See p. 246.

I have studied an edition of 1778 (*Α. τοῦ ἐν τύρῳ, Ρημάδα, Ἐνετίησιν*, 1778) and have come to very different conclusions from those arrived at by previous scholars. Wagner says, "The language is very difficult and seems to be the bad jargon of the islands" (*M. G. T.*, p. xviii). It is evident that Wagner knew very little of the Greek dialects, and this bit of superficial criticism is characteristic of the carelessness and ignorance which prevail in both his books, and yet critics and bibliographers seem blindly to have followed Wagner's lead without undertaking to examine for themselves the language of the text. The work (translation or transcription) was done in Crete, a fact which was unknown to most of the scholars who described the poem, although the place and time are explicitly stated in the body of the text. The language is difficult for any one unfamiliar with the dialect. It is not "bad jargon;" on the contrary, the poem is well written, in the Cretan dialect, and it should be remembered that at the time the work was done (1500), Crete was more literary and more classical than Greece itself. Greece had passed under the Turkish yoke: Crete was still Venetian. Much difference of opinion has been expressed as to the source of the Cretan version. Prof. Konrad Hofmann thinks it was derived from the Italian ("Von zwei griechischen Bearbeitungen die wir haben, ist die eine des 13. Jahrhunderts aus einem lateinischen, die andere des 16. aus einem italienischen Texte geflossen," *Sitzungsberichte der ph.-ph. u. hist. Cl. d. kön.-bayer. Akad. d. Wissensch. zu München*, 1871, Ht. 4, S. 416). The consensus of opinion, however, favors translation from a Latin text. But Edelestand Duméril asserted its derivation from the German of Johann (*sic*) von Neuenstadt!—"la redaction en grec moderne á été faite d'après la version Allemande" (*Floire et Blanceflor*, Paris, Jannet, 1856, p. cv). What Duméril's exquisite reason was, I do not know, but there is less resemblance, if anything, between Gabriel Kontianos and Heinrich v. Neustadt than between Gabriel and Shakespeare.

The name of the author or transcriber has also set the editors guessing. M. Sathos says that the translation of the poem into Greek was made by Constantinos *Temenos*, a Cretan (*Κωνσταντίνος Τέμενος κρὴς ἐστιχούργησεν ἢ μᾶλλον μετέφρασεν ἐν ἔτει* 1500 *τὰ κατὰ τὸν ἐν τύρῳ Ἀπολλώνιον*, etc.; cf. *Νεο ἑλληνικὴ Φιλολογία*, p. 230). Wagner puzzles over Sathos for awhile and decides that he does not know the reasons for the statement. The reason is to be found in Sathos' ignorance. He has mistaken the Cretan word *θεμένο* (*composed*) for a proper name![1]

But it is time to consider the text itself. It begins:

Ἀπολλώνιον τὸν ἐν Τύρῳ. Ῥημάδα, ἀζοή, ἐνετίῃσιν, 1778, *Παρὰ Δημητρίῳ Θεοδοσίῳ τῳ ἐξ Ἰωαννίνων.* Con Licenza de superiori. Inc. p. 3: *Μὲ δόξαν τοῦ Ἰησοῦ Χριστοῦ, ὅπ᾽ ὅλοι προσκυνοῦμε, Γιὰνὰ μοῦ δώσῃ δύναμιν, λόγον, καλὸν νὰ ποῦμε,—Κἰᾶν ἔσφαλα καὶ τίποτες ἆς ἔν συμπαθημένο, Γιατῖ ἔχαμα τὸ κάτεχα, καὶ τὄχα μαθημένο*, p. 71. The first two pages form an introduction on the part of the author. He invokes the help of Jesus Christ, attributes every event to Providence, justifies his attempt to have put into verse the story *he had read somewhere* and excuses himself for any mistakes committed on his part. The story begins on the first line of the third page and goes on to p. 69. The last eight verses of pp. 70, 71 state the Christian name of the author to be Constantine; his family name is omitted. It is distinctly stated that the poem was *concluded* at Canea in Crete on the first of January, 1500, the fete day of St. Basilios. This statement, which has been consistently overlooked by the historians, is in the following lines:

Ἐτελείωσα τ᾽ἀρχήνισα μὲ τοῦ θεοῦ τὴν χάρη,
᾽ς τοὺς χιλίους πενταχοσίους, τὸν μῆναν τὸν γενάρη.
᾽Σ τὴν πρώτην Βασίλειόν τε Ἁγίον τοῦ Πρεσβύτου,
εἰς τὰ Χανιὰ βρισκόμενος εἰς τὸ νησὶ τήν Κρήτη.
Πυίημα εἶν᾽ ἀπὸ χειρὸς Κωνστάντινου (*sic*, *Κωνστάντίου*?) *θεμένο,*
γιὰ νά με μακαρίζουσιν ἀπήτης ἀποθαίνω.
Κἰᾶν ἔσφαλα καὶ τίποτες ἆς ἔν συμπαθημένο,
γιατὶ ἔχαμα τὸ κάτεχα καὶ τὄχα μαθημένο.

Finally in regard to the name of the author, Wagner entertains in his second book (*Carmina*) "grave suspicions" that Gabriel Contiani is not the name of the poet, but only of the copyist, in which for once he is right. Some commentators have supposed

---

[1] Numerous scholars, even the latest, S. Singer, have repeated the error.

Kontiani to be derived from *Κόμης* (Conte), an Italian title introduced by the Venetians who then held Crete, and have believed that the writer therefore belonged to the Western Catholic Church. But this supposition is confuted by Koraes, in his *Atacta*, Vol. ii, prolegomena, p. 13, where he shows that "Gabriel" clearly points to the Oriental Church.

RUSSIAN VERSIONS.

In Russian literature the story of Apollonius is derived from the Russian translation of the *Gesta Romanorum*, which in turn rests upon the Polish rendering of the *Gesta*. G. Polivka, of all the Russian scholars, has studied the subject most closely. In the *Listy filologicke*, 1889, 353–358 and 416–435, he demonstrated the relations of the Russian and Polish versions of the *Gesta*, and discussed the curious Bohemian version of the *Apollonius*. In the *Drobné prispevky literárne historické* (brief literary notes), Prague, 1891, he compared the *Gesta Romanorum* and the Tichonravov texts, but came to no positive conclusions. Dr. Murko, of Vienna, was of the opinion that the Tichonravov text was only a careful treatment by a Moscow scholar of the White Russian *Rimskija Dejanija*. In 1892 he contributed to the *Archiv für Slavische Philologie* (14: 405), a careful paper entitled, "Die russische Uebersetzung des *Apollonius von Tyrus* und der *Gesta Romanorum*." For the Tichonravov text, see *Letopisi russkoj literatury* (chronology of Russian literature), 1859, and *Russkij folol Vestnik* (1891, Part ii, p. 314); for the *Rimskija Dejanija*, see *Obscestvo ljubitelej drevnej pismennosti* (St. Petersburg, No. 117). A selection of stories from the *Rimskija Dejanija* was made and published at Cracow by Siekielowicz in 1663, and this collection was translated from Polish into Russian "in the summer of 7199" (that is, of the Byzantine era = 1691 A.D.).

The Bohemian folk-book, to a description of which we shall arrive later, is entitled *Kronyka o Apollonwi Krali Tyrskem*, W. Gindrichowe Hradcy, 1733. It was reprinted, Olomanci, 1769, and Praze, 1761. See Dobrowsky, *Geschichte d. Böhm. Sprache*, p. 303. It is also printed direct from the MSS. by A. J. Vrt'atko, Casopis Musea Ceskeho, 1863.

THE STORY IN ENGLISH.

We have now spoken of the story as it appears in Germany, Denmark, Sweden, Holland, Italy, Spain, France, Hungary, Greece, Russia and Bohemia. It remains for us to consider its course in English literature. Most curious is the form it takes in Anglo-Saxon, where it exists as the only romance in that literature. The historian must take notice of eight versions of the story in English literature.

1. The Anglo-Saxon romance (a MS. in C. C. C., Cambridge).
2. An early English metrical translation (Wimborne, Dorset).
3. Gower's *Confessio Amantis*, 1483.
4. Copland's translation from the French. Pr. by Wynkyn de Worde, 1510.
5. Twine's *Patterne of Paineful Adventures*, 1576.
6. Shakespeare's *Pericles*, 1609.
7. Geo. Wilkins' *Pericles Prince of Tyre*, a novel, 1608.
8. Lillo's *Marina*.

The old English or Anglo-Saxon version is believed by Wülker to belong to the second third of the eleventh century. Ebert prefers to date it from the beginning of the century. It exists in a unique MS. in the library of Corpus Christi College, Cambridge. Thus before the Norman conquest brought the chivalry and romance of southern Europe into England, some unknown but not unskillful hand, as if presaging the time when the new ideas of courtliness and chivalry should embody themselves in the romantic forms of the Elizabethan age, had translated this universal favorite.

The MS. was first studied by Benjamin Thorpe, F. S. A., who published it with a literal translation in 1834. It is referred to by Wülker, *Grundriss*, p. 504; H. Leo, *Altsächsische und Angelsächsische Sprachproben*, 32–34; B. Thorpe, *Analecta Anglo-Saxonica*, 108 (1846); Müller *Angelsächsisches Lesebuch*, 56–62, and by Zupitza, *Anglia*, Bd. i, 463-467. The MS. has now been thoroughly edited by Zupitza.[1]

It is but a fragment. Thorpe fills the lacunæ in his translation with quotations from Swan's rendering of the narrative in the *Gesta Romanorum*. Prof. A. S. Cook, in his *First Book in Old English* (Ginn & Co., 1894), has also reëdited bits of the old text.

---

[1] Zupitza discusses carefully and learnedly the question "Welcher Text liegt der Altenglischen Bearbeitung der Erzählung von Apollonius von Tyrus zu Grunde?" in *Romanische Forschungen*, Vol. iii, pp. 269–279. The article should be read for the interesting parallelism between the A.-S. and the Latin MSS. of Riese's third class. Zupitza's edition of the A.-S. is in *Archiv für das Studium der neueren Sprachen u. Litteraturen*, 1896, Vol. xcvii, pp. 17–34; intro. note by A. Napier.

In 1850 J. O. Halliwell (Halliwell-Phillipps) printed for private circulation: *A new boke about Shakespeare and Stratford-upon-Avon.* He introduced into it a "curious and interesting fragment of a very early English metrical translation of the story of Apollonius, King of Tyre." It is copied from a MS. on vellum which had formerly belonged to Dr. Farmer. The MS. had but two leaves and had been converted into the cover of a book, the edges were cut off, and some words were altogether lost in consequence. Steevens had quoted a few lines from it (cf. Malone's *Shakespeare*, ed. 1821, Vol. xxi, p. 221). "The author," says Halliwell, "appears to have resided at Wimborne Minster in Dorsetshire," and the MS. would appear from the language to be anterior to the appearance of Gower's *Confessio Amantis.*

The fragment is of considerable philological importance, and as it was printed in a limited edition of seventy-five copies, of which I believe fifty were destroyed,[1] I have ventured to reprint it here as a singular and interesting fragment of early English literature.[2]

. . . . . .

Sche was fairest of alle,
The Kyng . . . .
And on hys knees byfore hire falle

. . . . . .

He offryde and alle that wit him were
And afterw . . . .
drery chere;
Of Tire I Ar . . . .
. . . . myself there king,

---

[1] Halliwell-Phillipps was provokingly fond of printing his pamphlets and brochures in very limited editions. A wag said of him that he only printed two copies of his books—one he burned and the other he put in his private library.

[2] I have normalized the orthography of the MS. only in one particular, substituting for the so-called Anglo-Saxon g symbol (which had in ME. the value of a spirant) its later ME. representatives gh, and y according to the phonetic value of the symbol in each instance; following in this the orthographic usage of the later ME. MSS., which put gh for the guttural or back spirant, y for the palatal, and g for the stop. In Ags. up to the twelfth century only one character was used for the various sounds of g, viz., the Anglo-Saxon g. In ME. the so-called Frankish g (our modern g sign) was introduced to denote the stopped sound as in *go*, and the French sound of g in *rouge;* the Anglo-Saxon letter was retained for awhile to denote the spirant sounds of g, but in Chaucer's time it had been dropped and gh or y substituted.

Appolyn the . . . .
. . . . wit mine ofryng;
As sone as . . . .
. . . . upon my letterure,
The . . . . ing . . . . hedde
. . . . was ful suyre;
I scholde him . . . .
. . . . thulke cure,
Therfore he did . . . .
. . . . he gaf gret huyre;
To Tarse y· fledde that deth to . . . .
For hunger the cité was al nought,
An hundred milianys they hadde of me
Buschelles of whete, as y am by- thought.
Tho made they an ymage of bras,
A scheef of whete he helde an honde,
That to my licknes maad was;
Uppon a buschel they dyde hym stonde;
And wryte about the storye.
To Appolyn this hys y-do,
To have hym ever in memorye,
For he delyverede us fro woo.
Tho wente y unto Cirenen;
The kings doughter he me yaf,
I ledde here fro here kyn;
Ayeyn we broughte hire nought saf,
Ffor sche deyde amydde the see;
And ther sche bare this maide child.
That here stant byfore the:
Goude goddesse, be to hire myld!
Tho tok y the doughter in Tarse to kepe,
To Strangulion and Dame Denyse,
Y couthe no . . . . reed but ever wepe,
Sorwe me tŏk in ech wyse.
I held me in the see ten and four yeer
Wit sorwe, care and wo;
I cam aye and fond hire nought ther,
Tho nyst y what was best to do.
But, grete goddesse, y thanke the
That evere sche deth so asterte.
That ever y myyhte that day y·seo,
To have this confort at my herte!
The whiles he expounede thus his lyf
Wit sorwe and stedfast thought,
He tolde hit to hys awene wyf;
Sche knew him wel, and he hire nought.

Heo caught him to hire armes two,
For joy sche ne myghte spek a word;
The kyng was wroth, and pute her fro,
Heo cryede loude, ye beth my lord!
I am youre wyf, youre leof y-core,
Archistrate ye lovede so!
The kynges doughter y was bore,
Archistrates he ne hadde na mo.
Heo clipte hym, and efter gan to kysse,
And tolde that was byfalle;
Sche clipt and keuste with wouten lysse
And saide thus byfore hem alle,—
Ye seeth Appolyn, the kyng,
My maister thot taughte me al my goud.
. . . .
. . . . me out of my grace
Archistra . . . .
. . . . wham the other forsok,
And to my lord you ches ;
My lord that leide me on cheste,
Or y were cast into the see,
My lord that ofte me keuste,
And never wende me more y-see,
My lord that y have founde,
Y thanke God in Trinyté!"
Ure doughter on thys grounde,
Ye, dame, par fay, thys hys sche!
. . . . te he hire, me scholde nought knowe.
Ho was gladdest of the threo;
. . . . They wepte alle arowe,
That ech of other hadde pité;
Ephese hit was couth,
The goddesse had hire lord knowe,
. . . . An may no man telle wit mouth
The grete mirthe thot was mad, y trowe;
. . . . An song and made gleo
In gret confort of here goddesse,
. . . . thes y- streghyt over al thoe cité,
An keverede for gret gladnesse:
They made a feste of gret plenté,
And fedde the citesaynes alle at ones,
They made of him gret denté.
The fest was gret for the nones,
They made hym prest of the lawe,
Here norry that sche loved mest,
. . . . the maner by har dawe,
Wymmen dide thoe offys of prest.

. . . . the joye of thoe londe,
Sche dighte hire wit here lord to fare,
. . . . e cité broughte hem at stronde,
For deel of blisse wexeth al bare.
. . . . nte hy to Antioche,
Yutt was him kept thoe kyndom,
. . . . Yt fro thennys hys passage
To his lond Tire he nom;
Made Anategora kyng,
Hys doughter quene thoe was his heir,
. . . . ne hit was at her likynge,
To schip hy wente alle y-fere.
To Tarse they wente wit gret navye,
Wederynge fel at wille,
And all the citesaynes goune crye,
Welcome lord, us tille:
. . . . Yté anon Strangulion take,
And hys wyf, Denyse, also,
. . . . ed hem alle for here sake
Wit hym to have mothalle goo.
. . . . bet yif he hath trespased ought,
Other eny offense ageyn hem do,
. . . . yde alle nay lord ryght nought,
Ye beth oure lord forever mo.
. . . . ge have to lorde y- core,
For evere love you ne mote
. . . . hadde ye be ne hadde before,
Of alle bales ye were bote;
An image of brass witnesse hys,
Thot we schulle yow nevere disceyve,
. . . . ollet deye for you y-wys
Rather thon eny man schal you greve;
. . . . Angulion, my doughter y tok,
And Denyse that hys hys wyf.

. . . .

That the citesaynes wit gret deal
Hadde write hit to-fore youre eyye:
Appolyn gan to calle,
Tarse, doughter, wherevere you beo,
Schewe the forth byfore us alle,
Fro deth to lyf arys aye!
Sche pytte hire forthe in riche atir,
As fel to a quene,
To fulfille her fader desir;
"Denyse," sche seyth, "hail ye!
I grete the out of my grave

Fro deth to lyve areved!
Wher hys Tiophele? hym moste y have."
He stoud sire aferyd.
"Madame, y am her at youre wille!"
He stod as he schulde sterve:
"Sche tok me the to spille,
Deonyse whom I serve."
The citesaynes Strangulion toke,
And hys wyf for hire trecherye,
Out of the cité drowe wit hoke
Into a place ther-inne to dye:
They stened him wit stone,
And so hy wolde Teophele also;
Tarse bygan him defende sone.
To dethe he ne was nought do.
And saide, ye yaf me grace
To pray God Almyght,
I schal him yeve lyves space.
Ellys ye ne hadde ne never seye in sight;
Appolyn dwellede ther fourty dayes,
And gaf grete giftes to alle men;
And thennes sailede to Cirenen:
Yut was hys ffader-in-lawe alyve,
Archistrates the goud kyng,
ffolk come ayeynes him so blyve.
As eny myghte by other thryng;
They songe, daunsede, and were blythe,
That were hy myhte that day y-seo,
And thankede God a thousand sythe;
The king was gladdest, suyr be ye:
Tho he saw hem alle byfore,
His doughter and hys sone in lawe,
And hys doughter so fair y-core,
A kinges wyf, he was wel fawe:
And her child ther also,
Al clene of kings blod;
He kuste them, he was glad tho;
But the olde king so goud
He made hem dwelle al thoe yer,
And deyde in hys doughter arm.—
Wit gret gladnesse he deyde ther,
If God nolde hit was harm.
Tho nolde Appolyn nevere fyne
Ar he hadde the ffischere sought,
That yof him half hys sclaveyne,
Tho he was firste to londe y- brought;

Knyghtes him fette of gret honour,
He was aferde to be slawe,
He gaf him londes and gret tresour,
And made him erl by al hys sawe:
Olde man, ne dred the nought,
For I am Apollyn of Tire,
That ones help of the bysought,
Tho I lay byfore the in the myre;
Thou gave me half thy sclaveyne,
And bed me y schulde thenke on the;
. . . .
Broughte hym dyeinge.
Antiochus his deth hadde swore,
He was marchaunt of many thynges;
. . . . the kyng to grete,
He tok him up and gan him to kusse;
. . . . de he wolde him nevere lete,
He scholde be on of hem to wysse;
. . . . im bothe lovde and lede.
And made him erl a lite ther byside;
. . . . ful of wilde brede,
Casteles and tourys that were wyde,
He made him chef of hys consail,
For he fonde him ferst so . . . . t fewe:
. . . . as evere wit-oute fail,
He ne leet for no newe;
. . . . the kyng goud lyf and clene
Wit hys wyf in gret solas,
. . . . and fourtene
He lyvede after thys do was;
. . . . twey sones by junge age,
That wax wel farynge men;
. . . . the kyndom of Antioche,
Of Tire and of Cirenen.
Were nevere verre on hys lond,
Ne hunger ne no mesayse,
. . . . hit yede wel an hond,
He lyvede wel at ayse:
. . . . tweye bokys of hys lyf
That onto his awene bible he sette.
. . . . at byddinge of hys wyf . . . .
He lefte at Ephese so he hire fette;
. . . . hys lond in goud manere
Tho he drow to age,
. . . . ora he made King of Tire,
That was his owene heritage;

The eldest sone of that empire
He made king of Antiage,
. . . . that he lovede dure,
Of Cirenen that was . . . .
When he hadde al thys y-dyght
Cam deth and axede hys fee,
. . . . hys soule to God Almyght,
So wel God that hit bee;
. . . . de ech housbonde grace.
For to lovye so hys wyf
. . . . y-fed hem witoute trespace,
As sche dyde hym al here lyf;
. . . . ne on alle lyves space,
Heere to amende oure mysdede.
. . . . of hevene to have a place,
Amen ye synge here, y rede.
. . . . *ony thys was translatyd*
Almost at Engelondes ende.
. . . . to the makers stat,
Tak eich an . . . . kynde;
. . . . hove y- take hys bedys on hond,
And sayd hys Pater Noster and Crede,
. . . . *was vicary, y understonde,*
At Wymborne mynstre in that stede;
. . . . y thoughte you have wryte,
Hit is nought worth to be knowe,
. . . . thot wole the sothe y-wyte
Go Thider and me wol ye schewe;
. . . . Fader, and Sone, and Holy Gost,
To whom y clepide at my begynnynge,
. . . . de he hys of myghtes most,
Brynge us alle to a goud endynge:
Grannte us voide the payne of helle,
O God, Lorde, and persones threo,
And in the blysse of hevene dwelle!
Amen, pour charité!

3. We next find Gower telling the story, to the pious disgust of Chaucer, in the *Confessio Amantis,* which was finished not later than 1393, and most probably a year or two earlier, and which was first printed by Caxton in 1483. Gower confesses the source of his tale in his opening lines:

"Of a cronique in daies gon,
The wich is cleped Panteon
In loves cause I rede thus
How that the great Antiochus," etc.

Pudmenzky[1] thinks that Gower must also have used some other MSS., and his notion is perhaps borne out by Gower's own words when after a long digression he returns to his subject with:

> "But now to my matere agen
> To telle as *olde bokes* seyn."[2]

4. *Kynge Apollyn of Thyre* is a prose romance published in 1510 by Wynkyn de Worde, and translated from the French by Robert Copland. Its French parentage is the MS. in the British Museum (Royal 20, C. ii). It exists in but one MS., in the possession of the Duke of Devonshire, at Chatsworth, and has been reproduced in *facsimile* by Edmund William Ashbee, in 1870, only twenty-one copies printed.

5. We come now to the last version that preceded Shakespeare, and to which the latter is in part indebted. In 1576 appeared the novel, "gathered into English," entitled "*The Patterne of Painefull Adventures:* Containing the most excellent, pleasant and variable Historie of the strange accidents that befell unto Prince Apollonius, the Lady Lucina, his wife, and Tharsia, his daughter. Wherein the uncertaintie of this world, and the fickle state of man's life are lively described. Gathered into English by Laurence Twine, Gentleman. Imprinted at London by Valentine Simmes for the Widow Newman." There are two *Twines* in English literature, and we must be careful not to entangle them. Malone, Steevens and Douce attributed the translation to Thomas Twine, "the continuator of Phaer's Virgil." Laurence and Thomas Twine were brothers. The former and elder, the one of whom we have to speak, is defined for us by Anthony á Wood as "a fellow of All Souls' College, Bachelor of Civil Law, and an ingenious poet of his time." Of Master Laurence Twine's "ingenious poetry" we have no examples save the songs and riddles of Tharsia. It is noteworthy that a new edition of *The Patterne of Painefull Adventures* appeared in 1607, one year before *Pericles*, by William Shakespeare, was entered in Stationer's Hall. It is reprinted in *Shakespeare's Library*, Vol. iv, pp. 253–334.

---

[1] *Shakespeare's Pericles und der Apol. d. Heinrich von Neustadt*, Detmold, 1884, p. 4.

[2] Gower's version of the Apollonius is to be found in *Shakespeare's Library*, Vol. iv, pp. 181–228, printed from two MSS. in the British Museum (Harl. 3940 and 3869).

The line of succession does not cease with Shakespeare. We have still to name *Pericles, Prince of Tyre*, a novel by George Wilkins, printed in 1608, and having curious relations to the Shakespearean play. It was reprinted by Tycho Mommsen, under the title, "*Pericles, Prince of Tyre.* A Novel by George Wilkins, printed in 1608, and founded upon Shakespeare's Play. Edited by Professor Tycho Mommsen. With a Preface by J. Payne Collier, Esq. Oldenburg, 1857." Shakespeare's plays were often founded upon novels, notably upon those of *Cinthio* and *Bandello;* this is the first instance of a novel being founded upon a Shakespearian play. Collier told Mommsen that there was only one copy of Wilkins' novel in England. He cited the title-page as follows: "*The Painful Adventures of Pericles, Prince of Tyre.* Being the true history of the play of Pericles as it was lately presented by the worthy and ancient poet, John Gower, at London. Printed by T. P. [avier?] for Nat. Butter,[1] 1608." It is in quarto and consists of forty leaves. In the centre of the title-page is a wood-cut of John Gower, attired in a theatre cloak, with a staff in one hand and a bunch of bays in the other; before him, upon a desk, lies a copy of *Confessio Amantis.* In "The Argument of the whole Historie," with which the book begins, the reader is entreated "to receive this Historie in the same maner as it was under the habite of ancient *Gower*, the famous English Poet, by the King's Maiesties Players excellently presented."

Another copy was found in Zurich, which had belonged to the Swiss poet, Martin Usteri (1741–1827), a minor writer who had composed some lines in the style of Herrick:

> "Freut euch des Lebens
> Weil noch das Lämpchen glüht,
> Pflücket die Rosen
> Eh sie verblüht."

It was this copy that Prof. Mommsen reprinted. The contents of the novel we will consider when we discuss the *stability* of the saga.

Other late reappearances of the story are in Davenport, who uses the brothel scene, and in the Dutch play, *Alexander and Lodwick*, Amsterdam, 1618, supposed to be an adaptation of a

---

[1] It was for Nathaniel Butter that the first and second quartos of *King Lear* (1608) were printed.

THE
Painfull Aduentures
of *Pericles* Prince of
Tyre.

Being
The true Hiſtory of the Play of *Pericles*, as it was
lately preſented by the worthy and an-
cient Poet *Iohn Gower*.

AT LONDON
Printed by T. P. *for* Nat: Butter,
1608.

lost play by Martin Slaughter, that was performed for Henslowe in 1597–8. We have also hints of it in Randolph's *Oratio Prevaricatoria*, 1632, and *Hey for Honesty* (1636?). It is curious in the last-named work to notice that Randolph slaps Shakespeare for his "greed," to use a harsh word that became agreeable to the tongue of R. G. White after he had lost his early enthusiasm for Shakespeare, and when he was editing the Riverside edition.

George Lillo has a play entitled *Marina*, dedicated "to the Right Honourable the Countess of Hertford." The "*Prologue*" distinguishes between Shakespeare's part in *Pericles* and that of an inferior hand, and thus "strove to wake, by Shakespeare's nervous lays, the manly genius of Eliza's days."

Prologue.

Hard is the task, in this discerning age,
To find new subjects that will bear the stage;
And bold our bards, their low harsh strains to bring
Where Avon's swan has long been heard to sing;
Blest parent of our scene! whose matchless wit,
Tho' yearly reap'd, is our best harvest yet.
Well may that genius every heart command,
Who drew all nature with her own strong hand;
As various, as harmonious, fair and great,
With the same vigour and immortal heat,
As thro' each element and form she shines:
We view heav'ns hand-maid in her Shakespeare's lines.
Though some mean scenes, injurious to his fame,
Have long usurp'd the honour of his name;
To glean and clear from chaff his least remains,
Is just to him, and richly worth our pains.
We dare not charge the whole unequal play
Of *Pericles* on him; yet let us say,
As gold though mix'd with baser matter shines,
So do his bright inimitable lines
Throughout those rude wild scenes distinguish'd stand,
And shew he touch'd them with no sparing hand.
With humor mix'd in your fore-fathers way,
We've to a single tale reduc'd our play.
Charming *Marina's* wrongs begin the scene;
Pericles finding her with his lost queen;
Concludes the pleasing task. Shou'd as the soul,
The fire of *Shakespeare* animate the whole,
Shou'd heights, which none but he cou'd reach, appear,
To little errors do not prove severe.

If, when in pain for the event, surprise
And sympathetic joy shou'd fill your eyes;
Do not repine that so you crown an art,
Which gives such sweet emotions to the heart:
Whose pleasures, so exalted in their kind,
Do, as they charm the sense, improve the mind."

In Lillo's play the story is told in three acts. Naturally several of the *dramatis personæ* of the first act disappear; King Antiochus and his daughter, King Simonides, Lychorida, the nurse of Marina, and Cerimon and Philemon are not to be found. Escanes alone attends upon Pericles. In place of Cleon and Dionysa, Philoten appears as Queen of Tharsus; Shakespeare's Valdes is refashioned as chief of the pirates; Lysimachus appears as governor of Ephesus, and the scene is transferred from Mitylene to Ephesus. Lillo begins with Shakespeare's fourth act, in which Marina first appears.

The reader is referred for an analysis of the plot of *Marina* to *Shakespeare's "Pericles" und George Lillo's "Marina"* von Dr. Paul von Hofmann-Wellenhof, Wien, 1885, pp. 13–21.

SHAKESPEARE'S "PERICLES PRINCE OF TYRE."

The first mention of Shakespeare's *Pericles* is in the *Stationers' Register*, under date of May 20, 1608:

"Edward Blount entred for his copie under thandes of Sir George Buck Knight and Master Warden Seton a booke called *The booke of Pericles prince of Tyre*" (Arber's *Transcript*, iii, 378). It appears to have been produced in 1607 or 1608. In *Pimlyco or Runne Redcap*, the extant copies dating from 1609, but originally produced, according to Warton, in 1596, occurs the following reference to *Pericles*:

"Amazde I stood, to see a crowd
Of *Civill Throats* stretched out so loud;
(As at a *new-play*) all the Roomes
Did swarme with *Gentiles* mix'd with *Groomes*,
So that I truly thought all these
Came to see *Shore* or *Pericles*."

F. G. Fleay is inclined to think that the play was performed earlier than 1607. He fancies a resemblance between Act iii, Scene ii, of *Pericles* (the restoration to life of Thaisa) and a scene of sham restoration in *The Puritan*, a play acted in 1606. It is quite probable, however, that the likeness is accidental. The popularity of the play is apparently attested by Robert Tailor in *The Hogge hath lost his Pearle* ($\frac{1613}{1614}$):

> "If it prove so happy as to please
> Weele say 'tis fortunate like *Pericles*."

Richard Brathwaite, in his *Strappado for the Diuell* (1615), mentions "valiant Boults," who might therefore be a popular stage character. The story itself was declaimed against by the judicious. Chaucer assumed indignation at the publication of the story by Gower, and denounced *Apollonius* as "so horrible a tale for to rede." Owen Feltham, in *Lusoria* (1661), has the line:

> "displease as deep as *Pericles*."

And in like spirit Ben Jonson in his ode, *Come Leave the Lothed Stage* ($\frac{1629}{1630}$), complains of "Some mouldy tale like *Pericles*." Neither is the contemporary allusion to the success of the play all of one mind. Jo: Tatham, in verses prefixed to R. Brome's *Joviall Crew* (1652), says:

> "There is a Faction (Friend) in Town, that cries,
> Down with the *Dagon-Poet*, *Johnson* dies.
> Beaumont and Fletcher (they say) perhaps, might
> Passe (well) for current Coin, in a dark night:
> But *Shakespeare* the *Plebeian* Driller, was
> Founder'd in 's *Pericles*, and must not pass.
> And so, at all men flie, that have but been
> Thought worthy of applause."

On the other hand, Dryden (in 1672), in his Prologue to *The Conquest of Granada by the Spaniards*, speaking of the early plays as notable for "some ridiculous incoherent story, which, in one play, many times took up the business of an age," supposes he "need not name *Pericles*, *Prince of Tyre* nor the historical plays of Shakespeare."

In June, 1631, the play was performed on a special occasion, and the receipts, £3.10, taken at the Globe, were paid to Sir Henry Herbert, Master of the Revels, "for a gratuity for the liberty gain'd unto them of playinge, upon the cessation of the plague." Halliwell-Phillipps printed "a copy of a letter of News, written to Sir Dudley Carleton, at the Hague, May 24, 1619, containing a curious account of the Performance of the Drama of *Pericles* at the English Court. Printed anno domini 1865." [This performance of the play at court probably led to the publication of the fourth edition of the play in that year.] In this little book, of which only twenty-five copies were printed and fifteen destroyed by Halliwell in his usual provoking fashion, we read: "In the Kinges greate chamber they went to see the play of Pirracles, Prince of Tyre, which lasted till two o'clock. After two actes the playeres ceased till the French all refreshed them with sweetmeates brought on chynay voiders, and wyne and ale in bottelles. After the players begann anewe" (p. 11).

In recent times *Pericles* has rarely been acted. Alfred Meissner for a long time proclaimed that *Pericles* was the equal of *Winter's Tale* in its histrionic possibilities. His wish to see the play embodied in the German repertoire was finally realized. Possart produced it in Munich, October 20, 1882, and the magnificence of the acting and the stage appointments Meissner described with lively enthusiasm in the eighteenth volume of the *Shakespeare Jahrbuch.*[1] The resuscitation scene and the storm scene seem to have impressed the audience greatly, and from the third act the spectators were irresistibly carried away.

Pericles was several times published in quarto before it appeared in a folio edition. The first and second quartos appeared in 1609, the third in 1611, the fourth in 1619, the fifth in 1630 and the sixth in 1635. The play is not in the first or second folios, but is printed in the third folio (1664). That it was popularly ascribed to Shakespeare, however, there is sufficient evidence; as in Sheppard's *The times displayed in six sestyads* (1646):

> "With Sophocles we may
> Compare great Shakespear Aristophanes
> Never like him, his Fancy could display
> Witness the Prince of Tyre, his *Pericles*.

There is some doubt as to the priority of the two quartos of 1609. Both are in the British Museum, and both have been reproduced in *facsimile* by the Griggs process in the series of "Shakespeare quarto *facsimiles*." Introductions to the two quartos were written by P. Z. Round of St. Catharine's College, Cambridge, to whom I am indebted for many courtesies in my study of the quartos. The British Museum Catalogue names the C. 34, K. 36 copy the first quarto, and C. 12, H. 5 the second; but the Cambridge editors reverse the order of the two, and Mr. Round agrees with them (see introduction to Q. 2, p. x).

---

[1] The play was performed to the accompaniment of music. Herman Merivale has also written some charming songs for *Pericles*.

The title-page is the same for all the quartos:

"The Late, | And much admired Play, | Called | Pericles, Prince | of Tyre | with the true Relation of the whole Historie, | Adventures, and fortunes of the said Prince: | As also, | The no lesse strange, and worthy accidents, | in the Birth and Life, of his Daughter | Mariana. | As it hath been divers and sundry times acted by | his Maiesties seruants, at the Globe on | the Banck-side | By William Shakespeare | Imprinted at London for *Henry Gosson* and are | to be sold at the signe of the Sunne in | Pater-noster row &c | 1609."

It will be observed that the publishers call *Pericles* "a *late* and much admired play." The only hesitation in believing the play to be of 1608 arises from the allusion in Edward Alleyn's *Memoirs* to the use of "spangled hose in *Pericles*," which may refer to an earlier play of the same title.

Dryden in the Prologue to Davenant's *Circe* 1684, excused the blemishes in *Pericles* on the ground of its being the first heir of Shakespeare's invention:

"Shakespeare's own muse her *Pericles* first bore,
The prince of *Tyre* was elder than the *Moore*."

There is a discussion of the date and authorship of the play in the *Jahrbuch d. deut. Shak.-Gesellschaft*, Vol. iii, in an article by Delius.[1]

Prior to 1890 the British Museum copy (imperfect) of the third quarto[2] (1611) was believed to be unique. A perfect copy owned by Morris Jonas was described in *Notes and Queries*, August 2, 1890. I have collated this copy with Q. 1, and find very few important differences. The changes are chiefly in spelling and in punctuation.

---

[1] A. H. Bullen (*The Athenæum*, Sept. 21, 1878) directed attention to an early reference to a passage of *Pericles* found in *Law Tricks* a play by John Day:

Joculo: But, Madam, do you remember what a multitude of fishes we saw at sea? And I do wonder how they can all live by one another.

Emilia: Why, foole, as men do on the land, the great ones eate up the little ones (Sig. B3, recto).

Cf. the fisherman's colloquy in *Pericles*, ii, 1:

3 Fish.: Master, I marvel how the fishes live in the sea.

1 Fish.: Why, as men do a-land, the great ones eat up the little ones.

Law Tricks appeared in 1608.

[2] The British Museum copy lacks leaves D2 and D3 (27–30) of the *facsimile* of Q1.

The fourth quarto (1619) was probably published in consequence of the revival of interest in *Pericles* owing to the performance of the play at court.

No Shakespearian play, save one or two Histories, was so many times printed in quarto. Sir William Davenant's company acted the play between 1660 and 1671, and, according to Downes, "Roscius Anglicanus," *Pericles* was a favorite part with Betterton.

Why did not John Heminge and Henry Condell see fit to include *Pericles* in the first folio? The attempt to answer the question opens the whole problem of Shakespeare's part in the authorship of the play. Its first appearance in folio is in 1664, and the editors of that edition seem to have used the quarto of 1635 (this is the opinion of the Cambridge editors).

Three theories concerning the authorship of *Pericles* have received the critical attention of Shakespearian scholars. According to the first theory, Shakespeare is the sole author of *Pericles* but the play combines two periods of his life. In other words, it was taken up, as Staunton believed, soon after its appearance in 1590 and experimented upon by Shakespeare in his youth; then from some inexplicable cause it was cast aside, only to be resumed and completed after a lapse of twenty years. Malone, who advanced this hypothesis, afterwards abandoned it. Charles Knight restated it, but, in defiance of the contemporary accounts of it as a "new play" in 1608, insisted upon its having been acted at the outset of Shakespeare's career. If it had been played so early would Meres have forgotten to mention it when he named Shakespeare's plays in 1598? Prof. Paul Stapfer, the learned author of *Shakspere et l'Antiquité*, a work crowned by the French Academy, is a believer in this theory, drawn to it, I think, by his friend Hugo the Younger whose opinion he quotes.

Now can we hazard a conjecture as to why Shakespeare in his age dipped his arm into his wallet and fumbled about after this relic of his immaturity? Gervinus suggests that Shakespeare may have chosen it in order to give his friend Burbage the admirable title rôle. But Burbage's time of flourishing is identical with Shakespeare's maturity, and Gervinus could not believe that at that period Shakespeare could have written a play so faulty both in plot and style. Of course on the Stapfer-Hugo-Malone supposition it is easy to believe that Shakespeare dipped into his portfolio for a roughly sketched play that would answer his friend's desire and suit his capabilities.

The second hypothesis was the suggestion of Steevens and was upheld by Hallam and Collier. It asserts that Shakespeare adopted, as he so often did in his first period of apprenticeship, the work of another playwright, improved it, rewrote the last scenes, and put it upon the stage in 1608.

Shakespeare is believed to have been for some years a writer for the Lord Chamberlain's company. We know that he revised old plays and collaborated with unknown poets in the preparation of new ones. We know, too, that the various features of Shakespeare's art did not crystallize immediately into a personal and unmistakable manner. He was long a rhymster and a euphuist, plucking and checking at many things in his period of tentative endeavor, while his great predecessor, Marlowe, pursued his lonely and original road with invincible independence. We are bound, therefore, when a play comes to us with the name of Shakespeare upon it to weigh it to the uttermost scruple, for there is always a possibility that Shakespeare had a hand in it, either by way of trial, or in assisting another, or in introducing some felicitous touch into a work he was preparing for his own theatre. Because a play is not in the first folio is not conclusive witness against its genuineness; it may have been impossible to secure the play owing to the stubborn rights of some bookseller. Nor on the other hand does the appearance of Shakespeare's name upon a quarto play argue necessarily the authenticity of the play. Literary pirates abounded in the "spacious days of great Elizabeth," and the products of the stage were often stolen by shorthand writers for publishers who were "just right enough to claim a doubtful right."

There are many possibilities in the case of a dubious play. It may be a worthy work slightly retouched and heightened by the poet; such plays are the second and third parts of Henry VI. It may be an old piece entirely rewritten; such an one is *Romeo and Juliet.* It may be one in which Shakespeare wrought in concert with a fellow-author, and here we have for examples *Henry VIII* and *Two Noble Kinsmen.* It may be trial work rejected by Shakespeare and completed by an inferior hand. And it may be an old piece into which Shakespeare has worked new scenes. It is in accordance with this last thought that Stapfer and Hugo would explain *Pericles*. It is as if Shakespeare had thrown a giant's robe over the dwarfish limbs of the beggarly verse.

There is still another banditti of troubles ambushed for the unwary scholar; frequently playwrights of an inferior order so catch the secret of a master's manner that they counterfeit it exactly. The voice may be the voice of Shakespeare, but the thought is the thought of Wilkins or Rowley! Hence arises a dual possibility in a line that has the Shakespearean ring, but a suspicious poverty or flatness of meaning; it may be an authentic but juvenile expression, or it may be a clever counterfeit. There is the notable instance of Edward III, where some cunning hand has caught the style of both Marlowe and Shakespeare and blended them with singular vividness and vigor.

The third hypothesis is that proposed by Mr. F. G. Fleay. He undertakes to invert Steevens' supposition; that is, he gives to Shakespeare the original writing of the last three acts, subtracting Gower's part and the brothel scene. This outline, according to Fleay, was filled out by another poet of the company with the result which we know.

There has been a great throwing about of brains over the determination of the chronology of Shakespeare's plays. In some vain hope of approaching nearer to the personal life of Shakespeare, the scholars of the Shakespearean Guild have occupied their wit and ingenuity in dividing the poet's career into definitely marked periods, and seeking for a parallel between the works of each period and the events, ascertained or imaginary, of Shakespeare's life. The old Shakespeare Society, represented by Halliwell, Thom, Dyce, Collier and Peter Cunningham, scrutinized Elizabethan documents for every rag and remnant of external evidence bearing upon dramatic history. When in 1874 the New Shakspere Society was founded, an original method of inquiry into questions of chronology and authorship was instituted. Mr. Hales, in two lectures upon the occasion of the founding of the society by Mr. F. J. Furnivall, that indefatigable king of clubs, defined seven tests for determining the growth of Shakespeare's mind and art from the witness of the plays themselves: (1) external evidence, (2) historical allusions, (3) changes of metre, (4) changes of language and style, (5) power of characterization, (6) dramatic unity, (7) knowledge of life. Metrical tests soon overshadowed everything else in the society's work, Shakespeare was turned into a calculation table for the enumeration of feminine endings, stopt lines, middle cæsura, weak endings, middle extra syllables, and for the experiment of the initial trochee test, pause test, prevalent word test, and choric reflection test. Out of these researches and the development in the so-called æsthetic criticism of such uncouth terminology as "first reconciliation period," "second recognition period," etc., etc., there was constructed an ideal biography of Shakespeare. And without being actually advanced a single step in our knowledge and enjoyment of the Shakespearian drama, we were told to recognize in the order of the plays as fancifully set forth by the commentators the whole of Shakespeare's spiritual experience. We were to see him "in the workshop, in the world, out of the depths, and on the heights." Moreover, the New Shakspere Society made much of the discovery of strange hands in Shakespeare's text. This reference of dubious or dolorous lines to anonymous or conjectural aliens is as old as Coleridge, who, like Simpson, of Edinburgh, who was unalterably convinced of the infallibility of Euclid, fancied it impossible for Shakespeare to drowse, and so pronounced all his faults to be the intrusion of some unknown playwright. Our better informed critics identify the perpetrator of the outrage and brand upon him his mischievous meddling.

All of Shakespeare's plays, according to the laborious researches of the New Shakspere Society, fall into three or perhaps four groups—the lyric and fantastic, the comic and historic, and the tragic and romantic. And these groups comprehend the years that lie between 1590 and 1610. "The entrance to the third period of Shakespeare," says Mr. Swinburne, "is like the entrance to that last and lesser Paradise of old 'with dreadful faces thronged and fiery arms.'" It is the period of stormiest tragedy beyond and upon which shine the mellow glory and serene splendor of the romantic plays with which Shakespeare's career, victorious after years of disaster and bitter experience, concludes. In this final period *Pericles* is classed. With all his unrestrained eloquence, Mr. Swinburne, after washing his hands of the brothel scene in deference to a public of "nice and nasty mind," has said of *Pericles*: "But what shall I now say that may not be too pitifully unworthy of the glories and the beauties, the unsurpassable pathos and sublimity inwoven with the imperial texture of this very play? The blood-red Tyrian purple of tragic maternal jealousy which might seem to array it in a worthy attire of its Tyrian name, the flower-soft loveliness of maiden lamentation on the flower-strewn seaside grave of Marina's old sea-tossed nurse." The romantic character of the play, its blending of classical form and mediæval tradition—Goth and Greek each by the other—places *Pericles* in companionship with *The Tempest*, *Cymbeline* and *The Winter's Tale*. Without accepting or approving the methods of the New Shakspere Society, we may agree that *Pericles* belongs to Shakespeare's later years.

The results of the researches of Dr. Boyle (*Transactions of New Shak. Soc.*, 1880–1885, Pt. ii, pp. 323–340), P. Z. Round (Intro. to *Pericles*, Qu. 2) and Delius (*Jahrbuch*, 1868,) seem to indicate that George Wilkins wrote the first two acts and most of the Gower choruses, and that Rowley (?) wrote the brothel scenes.

Shakespeare's part, I hold to be his unfinished work upon what he meant to be the beginning and the end of a play of *Marina*. As we have the text it is marred throughout by the incapacity of the reporter and printer, pirates both. Shakespeare's unfinished work in the last three acts was completed and extended to five acts by a writer who added the Gower choruses. Delius was the first to discover this writer to be George Wilkins (*Shak. Jahrbuch*, 1868, pp. 175–204), but Delius erred in supposing that Wilkins' work preceded Shakespeare's.

Dr. Furnival, at a meeting of the New Shakspere Society, quoted Tennyson as saying that Shakespeare "'wrote all the part relating to the birth and recovery of Marina and the recovery of Thaisa. I settled that long ago; come upstairs and I'll read it to you.' Upstairs to the smoking-room in Seamore Place we went, and then I had the rare treat of hearing the poet read in his deep voice—with an occasional triumphant 'Isn't that Shakespeare?' 'What do you think of that?' and a few comments—the genuine part of *Pericles*. I need not tell you how I enjoyed the reading, or how quick and sincere my conviction of the genuineness of the part read was. But I stupidly forgot to write down the numbers of the scenes. However, when the proof of Mr. Fleay's print of *The Birth and Life of Marina* came, its first words, 'Thou God of this great Vast,' brought the whole thing back to me, and I recognized in its pages the same scenes that Mr. Tennyson had read to me." (*Transactions of the New Shakspere Society*, Series i, 1874, p. 252).[1]

THE STABILITY OF THE STORY.

It is remarkable that a saga so widespread should undergo so little change in the course of centuries. Occasionally an episode is broadened by the narrator, or local color is painted freely into the work; but the chief outlines of the story remain practically unchanged. The Latin MSS. vary greatly in style and diction. It is clear that many of them are slovenly copies, and Riese, in editing the tale for the Teubner classics, produced an ideal text, that is to say, he mixed the language of several MSS. in the effort to make a clear and readable version.

A careful examination of the MSS. and a consideration of their discrepancies (chiefly verbal) lead to the conclusion that the story has descended along three parallel lines: from the first Godfrey of Viterbo was derived; from the second the *Gesta Romanorum* and the French MS. of the thirteenth century; and from the third the Anglo-Saxon version. The principal mediæval versions may be classified as follows:

Godfrey of Viterbo.	*Gesta Romanorum.*
Steinhöwel.	French and, indirectly, Italian.
Gower.	Twine.
Shakespeare.	Timoneda's Spanish.
Wilkins.	The Holland *volksboek.*
	The Hungarian, Swedish, Slavic versions.

Shakespeare is the first narrator of the ancient story to change the name of the hero. The commentators upon the play have usually been satisfied with the conjecture of Steevens that the name *Pericles* was taken by Shakespeare from Sidney's *Arcadia*, where *Pyrocles* figures as one of the characters. It is one of the curious coincidences in the history of this saga, even if it be of no further importance, that in the French prose version Apollonius calls himself *Perillie*, in answer to the query of the daughter of Archistrates.

The appearance of Gower as chorus and prologue points immediately to Shakespeare's source of information. He says:

---

[1] George MacDonald made independently a similar division of scenes (see Fleay's *Marina*).

> "This Antioch, then, Antiochus the Great
> Built up, this city, for his chiefest seat:
> The fairest in all Syria."

This is an expansion of the *Historia*, which simply affirms, "In civitate Antiochia rex fuit quidam nomine Antiochus, a quo ipsa civitas nomen accepit Antiochia." Twine is the source of Shakespeare's lines in this instance. "The most famous and mightie king Antiochus, which builded the goodly citie of Antiochia in Syria, and called it after his own name, as the chiefest seat of all his dominions." Twine's version in this as in many places corresponds with the Swedish, both proceeding from a common source in the *Gesta*.

When Pericles appears in the palace at Antioch (Act i, Sc. 1), Antiochus says to him:

> "Young prince of Tyre, you have at large received
> The danger of the task you undertake."

And Pericles answers, "I have, Antiochus." Here Shakespeare follows the *Historia* as translated by Twine: "juvenis nosti nuptiarum condicionem? At ille ait 'novi'" ("Dost thou knowe the condition of this marriage? Yea, sir King, said Apollonius," Twine).

Singer, *Apollonius von Tyrus*, has carefully compared the readings of the play with the corresponding passages in the other versions; and to his book (pp. 32–67) the student is referred for more minute observation than is possible here.

When Antiochus declares that Pericles has misinterpreted the riddle, he respites him *forty days*, which is the time allowed in the Italian version of Leone del Prete; the Greek has *twenty*; Steinhöwel has *three*; the French and Bohemian have *one*; all other versions have *thirty*. Sometimes a reason is given for the respite, sometimes not. When a reason is given it is usually like that in *Pericles*.

> "This mercy shows we'll joy in such a son" (I, i, 118).

(Cf. Heinrich von Neustadt, "Waerstu nicht so ritterlich, schön, mächtig und reich.")

The names of the characters undergo considerable change, the murderer sent forth by Antiochus is called by Shakespeare Thaliard, in Gower he is called Taliart, in Latin Thaliarchus, in Twine Thaliarch, and in the Vienna *incunabulum* Taliardus.

The friend of Pericles, who is called by Shakespeare Helicanus, appears in the Latin MSS. as Hellenicus, Hellanicus, Ellanicus; in Italian, Ellanicho; in Heinrich, Elanicus; in the *incunabulum* and the *Gesta,* Elamicus; in Steinhöwel, Elemitus; in Bohemian, Klavik; but in Polish and Russian, Elavik; in Timoneda, Heliato; in the Swedish, Elancius; in French, Heliquain; in Gower, Helican; in Twine, Elinatus.

Cleon is the name which Shakespeare gives Stranguilio, as he is called in Gower and Twine and the *Gesta* and most of the MSS., though he becomes Stragul in Bohemian; Stragwilio in the Munich codex; Estrangilo in Spanish; Tranquilio in Godfrey; Tranquyle in Copland, and Transqualeon in French. His wife is named *Dionyza;* in Latin, *Dionysias; Dionysiades* in Steinhöwel, Twine, Heinrich and Bohemian; *Deonise* in French, and *Dionise* in Gower.

In Shakespeare the servant of Cerimon is named *Philemon,* nearly as in Heinrich, *Philominus,* and in Bohemian *Silemon.* In Twine he is called *Machaon;* in Swiss *Pandekta.*

Boult is called in some MSS. *Amiantus;* in Heinrich, Turpian; in Greek, *Πωκαρώπα*; in Italian, *Pocaroba* (Singer conjectures that Boult or Bolt is used euphemistically for *penis*).

Leonine is Shakespeare's name for the servant of Dionyza; he is called *Theophilus* in most versions, while Leonine is the name of the keeper of the brothel in Gower.

Shakespeare departs widely from the *Historia* in the names of the *dramatis personæ.* In the play Athenagoras becomes Lysimachus; Archistrates becomes Simonides; Hellenicus becomes Helicanus; Tharsia becomes Marina; Stranguillio becomes King Cleon; Apollonius becomes Pericles.

Dionyza takes under Shakespeare's hand almost the demoniac character of Lady Macbeth. Boult is not new to the story, but is remade. Shakespeare takes Gower's form of a name wherever it differs from the name in Twine.

Gower.	*Twine.*
Hellicanus.	Elinatus.
Thaliard.	Taliarchus.[1]
Dionise.	Dionisiades.
Lichorida.	Ligozides.
Philoten.	Philomacia.
Metilene (the city).	Machilenta.

---

[1] Thaliart in Wilkins.

Twine calls the daughter of Apollonius Tarsia and the mother Lucina; Gower gives the mother no name and calls the daughter Thaisē (the Anglo-Saxon text calls the country *Thasia,* which corresponds to Shakespeare's *Thaisa*). In the *Patterne of Painefull Pleasures* it is Cerimon's pupil, Machaon, who discovers the presence of life in the body of Lucina. And this is the original plan of the Latin *Historia.* In Heinrich v. Neustadt, Gower and Shakespeare it is Cerimon himself who restores the princess to life. If we consider the incident of the erection by the grateful citizens of Tharsis of a statue to the hero who has timely succoured them against famine, we find it in the oldest MSS., in Heinrich von Neustadt, the *Gesta Romanorum,* and it naturally flows thence into Twine, Shakespeare and Wilkins. Gower has copied his account from Godfrey, but adds a touch; the statue, he says, was "overgilt." Twine has: "they erected in the market-place a monument in the memoriall of him, his stature made of brasse, standing in a charret, holding corne in his right hand, and spurning it with his left foot." Collier observes that "Shakespeare wrote *statute* for *statue,* probably as a joke at the expense of the ignorant folks *temp.* Elizabeth; but in the *Gesta Romanorum,* ed. Madden, p. 25, we have *statute* for *statue,* and it is to be suspected that the word in the text should properly be statute" (Collier, *Shakespeare's Library,* Vol. iv, p. 263; *statue* is the spelling of Q.1, *statute* of Q.2, Q.3).

"And to remember what he does
Build his statue to make him glorious."
(*Pericles,* ii, Pro.)

The vows of Apollonius have special interest. Shakespeare makes Pericles say of his daughter:

"Till she be married, madam
By bright Diana, whom we honour, all
Unscissared shall this hair of mine remain,
Though I show ill in't." III, iii, 27.

This is all that Shakespeare gives of the ancient vows common to both Latin and Teutonic peoples. Twine says, "hee sware a solemne othe, that he would not poule his head, clip his beard, nor pare his nailes untill hee had married his daughter at ripe yeares."

The episode of the striking of Tharsia by Apollonius varies in the different versions. It is an incident more repugnant than the brothel scenes. In *Pericles* the brutal act is not performed, but a reminiscence of it lingers in:

> "I said my lord, if you did know my parentage
> You would not do me violence." (V, i, 100.)

These lines are insusceptible of explanation without a knowledge of the earlier versions of the story. There is a hiatus here that must be supplied by reference to Shakespeare's predecessors (see Appendix, p. 308). Twine has, "Then Apollonius fell in a rage, and forgetting all courtesie, his unbridled affection stirring him thereunto, rose up sodainly and stroke the maiden on the face with his foote, so that shee fell to the ground, and the bloud gushed plentifully out of her cheekes. And like it is that shee was in a swoone." Godfrey writes, "Pulsaque calce patris Tharsia læsa dolet," while in Gower it stands:

> "And after hire with his honde
> He smote: and thus whan she hym fonde
> Diseasyd, courtesly she saide
> Avoy, my lorde, I am a mayde
> And if you wiste what I am
> And owte of what lynage I cam
> Ye wolde not be so salvage."[1]

The last element of the story that Pudmenzky employs for comparative purposes is the *riddle* (cf. Pudmenzky, *Shakespeare's Pericles und d. Apol. des Heinrich v. Neustadt*, p. 17). There is first the evil riddle that Antiochus proposes to Apollonius, and later occur the riddles that Tharsia puts to the King for his solution when she plays the harp before him to dispel his melancholy. In the old Latin *Historia* her riddles are eight in number, and the answers are unda, pisces, navis, balneum, spongia, sphæra, speculum, rotæ, scolæ. These very riddles are in the riddle bag of the mysterious Symphosius, to whom we have already referred (cf. Douce, *Illustrations of Shakespeare*, ii, 137). The *Gesta Romanorum* gives only three riddles. And none at all are found in Godfrey, Gower or Shakespeare (save in Shakespeare the first riddle borrowed from Twine). The literary fashion of the time had changed, and this particular form of diversion was obsolete, yet the appearance of the one riddle in Shakespeare—wretched as it is—is an interesting survival of a once popular and significant species of literary entertainment. Riddle-teaching was parable-preaching. It was a mnemonic device, and it became, no doubt, cottage wisdom. But certainly in its genesis, at least, it contained suggestions of something deeper, and the riddle was employed to conceal dangerous truth.

---

[1] In the Greek romance of *Chariton* the hero kicks his wife so that she falls unconscious, and is believed to be dead.

The points of likeness between Gower and Shakespeare are brought out by P. Z. Round in his "Introduction" to Griggs' *Facsimile* Quartos. The source of the play is mainly the story as told in *Confessio Amantis* (Bk. viii), but the recrimination scene between Cleon and his wife (iv, iii) is from Twine.

Wilkins borrowed phrases from Sidney's *Arcadia,* which are pointed out by the Variorum editors.

Twine follows the Latin *Historia* rather narrowly, but adds occasionally to the narrative. The additions are the following (I quote from the reprint of Twine in Hazlitt's *Shakespeare Library*):

P. 264, lines 11–22 the storm at sea (cf. *Tempest,* in Griggs qu.).

P. 265, "a rough fisherman, with an hoode upon his head, and a filthie leatherne pelt upon his backe."

P. 273, line 10, "examining her urine."

P. 275, lines 14–21 and 22–25 (cf. Chap. vi).

P. 276, lines 23 to bottom.

P. 277, the king's speech to Apollonius, and Apollonius' answer.

P. 278, 279, the description of the marriage. Twine depicts the dresses and jewelry.

P. 284, description of Lucina's faultless beauty.

P. 296, explanation of the term *Priapus.*

P. 303, lines 9–13, 19–23, 25–28.

P. 312, lines 7–18.

P. 320, lines 10 to bottom.

P. 321, lines 18 to bottom.

P. 323, lines 7–20.

P. 325, lines 7–16.

Nearly all of Chap. xxii is original with Twine.

P. 330, line 19 to end of Chap. xxiii.

Generally speaking, Twine enlarges as much as possible, giving speeches in full even when the substance has been related previously. Wilkins did not improve the parts he stole from Twine; witness the account of the wedding festivities and the storm.

Twine was far surpassed, however, as an amplifier by Heinrich von Neustadt, who goes minutely into a description of Tharsus and the medical lore of his time. Philomin, the forward pupil, says to Orrimonius (Cerimonius), his master:

"latwerjen traget her
die zer amehte sin guot
und die daz geliberte pluot
von dem herzen triben
ez geschiht gern den wiben
daz sie amehtig müezen wesen
so sie der Kinder genesen.
Man truoc dyatameron
und dyamargariton
und cum miscopliris
dytardion des si gewis.
Man prahte ouch da pi
dyarodon Julii.
Cinciat und mitratacum.
Antibacum emagogum
die latwerjen sint so guot
swem deu amaht we tuot.

. . . .

da gap man der siechen
guoten win von Kriechen
pinol von Ciper und Schavernac
malvasiam und Bladac
win von Chreidpinel
turchies unde muscatel
moraz unde lutertranc.
Reinval douhte in ze kranc" (*Apol.*, 2714–2777).

Notice also this Whitman-like catalogue of stones:

"Nu merket hie gemeine
die ouzerwelten steine
die in die Krone sint geslagen
als sie der fürste solde tragen.
da ist abeston und absinth
adamant, achat, und jacinth
allabandin und allechorius
ametist unde amandius
perillus und calcedon
carbunculus und calophagon
centaureus und celonite
calidonius und cegolite
corniolus und corallen
crisopassus und cristallen

djadochus und dionysya
echites elydropia
epistratis galaritide
jaspis und gerachide
panterus und obtallius
prasius und saffyrus
sardonix und sardius
topasios und smaragdus,
die steine war en drin gesazt
alle in püschelin gevazzt" (*Apol.*, 18,416–18,439).

Collier, in his introduction to Mommsen's edition of Wilkins' novel, attempts to prove two contentions: first, "that the novel before us very much adopts the language of the play; second, that it not infrequently supplies portions of the play as it was acted in 1607 or 1608, which have not come down to us in any of the printed copies of *Pericles.*"

In illustration of the first point, Collier quotes from the novel, "A Gentleman of Tyre—his name Pericles—his education been in arts and arms, who, looking for adventures in the world, was, by the rough and unconstant seas, most unfortunately bereft both of ships and men, and after shipwreck thrown upon that shore;" and cites the parallel passage from the play:

"A Gentleman of *Tyre;* my name *Pericles;*
My education beene in Artes and Armes:
Who looking for aduentures in the world,
Was by the rough Seas reft of Ships and men,
And after shipwracke, driuen upon this shore" (II, iii, 81).

Collier has greater difficulty in discovering in the text of the novel the lost language of Shakespeare. Act iii, Scene i, of the play, as it is printed, relates mainly to the birth of Marina at sea during a storm. In the novel Pericles thus addresses the infant: "*Poor inch of nature!* . . . . thou art as rudely welcome to the world, as ever princess babe was, and hast as chiding a nativity as fire, air, earth and water can afford thee." In the play as printed no corresponding commencement of the apostrophe, "Poor inch of nature!" is to be found, and yet the words must have come from Shakespeare. No mere hackney scribe could have conceived them. Moreover, the words which follow are nearly identical in the play with the sentence from the novel:

"Thou art the rudelyest welcome to this world,
That euer was Princes Child: happy what followes,
Thou hast as chiding a natiuitie,
As Fire, Ayre, Water, Earth and Heauen can make" (III, i, 30).

Here, as Collier says, "'Poor inch of nature' is all that is wanting, but, that away, how much of the characteristic beauty of the passage is lost" (Intro., xxxiii).

Correlated Stories.

When, in 1852, Konrad Hofmann edited the two old French Carlovingian poems, *Amis et Amiles* and *Jourdains de Blaivies*, he did not observe the intimate relation which a part of the latter chanson bears to the celebrated and widely disseminated story of Apollonius of Tyre. As soon as the common origin of the two poems became clear to him, he published in the *Sitzungsberichte der philosophisch-philologischen Klasse der k.-b. Akad. d. Wissensch. zu München* (S. 415–418), 1871, a paper on "Jourdain de Blaivies, Apollonius von Tyrus, Salomon und Marcolf." John Koch, in 1875, in an Inaugural Dissertation at Königsberg, again demonstrated the identity of the two stories, and finally Hofmann completed the study in his *Amis et Amiles und Jourdains de Blaivies* (Erlangen, 1882). We have already noted in speaking of the persistence of the saga that in old French there was but one prose version of the Apollonius, and no new poetic rendering of the story; a circumstance a little surprising when we remember with what avidity the old French grasped new materials, and reduced them to acceptable and popular forms. It is therefore a satisfaction to recognize the old romance undergoing a metamorphosis in the epic of *Jourdains de Blaivies.*

Berger next published an edition of *Orendel* (Bonn, 1888), a middle high German minstrel song which originated, Berger thinks, as early as 1160 (Paul and Braune 13, i). In the twelfth century, the court circles of Germany looked to France for literary inspiration. The most notable epics of the Rhineland that were uninfluenced by the courtly epic were Orendel and Salomon and Markolf. The Crusades form the background of these poems; the scenes are in the Orient, and the incidents are wars between heathen and Christian. Through varying repetition of the original fable, and by the introduction of auxiliary motives, sufficient bulk for a romance was obtained, and the characters of the beggar, the pilgrim and the minstrel were introduced.

Orendel is a king of Treves who wins the love of Bride, the heiress of Jerusalem; wanders like Ulysses; twice frees the Holy Sepulchre, and brings the Holy Coat to Treves. His counterpart is in Snorre's *Edda*, i, 276, which in Norway was connected with the myth of Thor. Müllenhoff disentangled the primitive mythical Teutonic saga upon which the minstrel based his story (*Deut. Altertumskunde*, i, 32). L. Beer (*Beiträge*, 13, i) opposed the conclusions of Müllenhoff, which, however, were reasserted by F. Vogt in Paul's *Grundriss*, ii, 1, 63, 64.

Svend Grundtvig pointed out similarities of incident and construction in *Orendel* and the Danish ballad (see page 232), and finally Singer (*Apollonius von Tyrus*, pp. 3–33) has compared in detail the three pieces, Orendel, Jourdain and the Danish ballad. The relationship between Orendel and the Apollonius saga has been farther discussed by Tardel (*Untersuchungen zur mittel hochdeut. Spielmannspoesie*, Schwerin, 1894). It is necessary for us to deal connectedly with this singular group of widely separated yet curiously united fables.[1]

In the French poem Jourdain's parents have been murdered by Fromont, and their lands taken from them. Jourdain is cared for and educated by the faithful Renier. Fromont sends out two traitors, to whom he promises five hundred pounds if they bring the child to him. Here the likeness is closest to the old French prose version in which Antyocus (Antioch) is a vassal of the father of Apolonie. When the father is dead, Apolonie is reared by Transqualeon, the provost (prevost) of Tarse. Antyocus oppresses his subjects and is warned by his wife that the people may invoke Apolonie. Thereupon Antyocus sends out thirty men to lay hold upon Apolonie, but he escapes all dangers (si loing que il fust perille). The reward offered to him who shall bring Apollonius alive is in some of the Latin MSS. 100 talents (Riese), and in others fifty. In the Bohemian and Swedish prose versions it is 500 talents.

Jourdain escapes the danger that menaces him, through the device and the devotion of Renier, who sacrifices his own child in his stead[2] (Nyrop-Gorra, *Storia della epopea francese*, 196).

After a time, when Jourdain is well grown, he serves Fromont, unrecognized by him, as a page, but Fromont hates him, for he resembles his slain father (Girard). One day Jourdain carries a golden vessel filled with wine to Fromont, who keeps him kneeling. Jourdain complains; Fromont threatens him with worse treatment, whereupon Jourdain retorts and Fromont strikes him with a stick across the head so that he bleeds. Jourdain escapes to Renier, who discloses to him the secret of his birth. Jourdain goes with armed men to Fromont, finds him at the table and with his sword strikes off his nose. In the battle that ensues, Lohier, the son of Charlemagne, takes part and is killed by Jourdain, who takes flight, pursued by the emperor. The old tale of incest is abandoned by the French author. Hofmann sees in Karl (Charlemagne) the image of Antiochus in the old story, but Singer with more reason fancies Fromont to replace Antiochus, and that Karl is only introduced in order to carry the story back to the well-known Carlovingian type.[1]

---

[1] There is a very rare folks-book published in Paris in 1520 entitled, *Les faitz et prouesses du noble et vaillant cheualeir Jourdain de blaues filz de Girard de blaues lequel en son vivant conquesta plusieurs royaulmes sur les Sarrazins.* Paris, Michel le noir, 1520.

[2] In Timoneda's *Patrañuelo*, No. 37, an only son is sacrificed to save a friend's son.

The poet adds a ghastly humorous touch when he says that Fromont, in order not to suffer alone the shame of his mutilation, orders his knights to have their noses cut off. Singer compares the narrative in the *Kaiserchronik* and in *Toledoth Jeschu* (*Zeitschrift d. Vereins f. Volkskunde*, ii, 295).

In the adventures that follow, there is an attack by Saracens, of which we shall speak later. Jourdain springs from the deck of the Saracen ship into the sea, and clinging to a tree bough bites his arm and is cast up by the sea upon a foreign shore. The biting of the arm is an allusion to the medieval belief that the sea would permit no bleeding or wounded thing in its dominion (see page 281).

> "Il s'est navrez el bras de maintenant
> N'avoit autre arme, dont il se fust aidant,
> Por ce le fist, gel voz di et creant,
> *Mers ne puet sanc souffrir ne tant*"[2] (*J. de B.*, 1260).

Apollonius after his shipwreck arrives at Pentapolis, on the north African coast, in the kingdom of Archistrates, who is depicted as a Greek. Jourdain finds himself in the realm of King Marcus, who is a Christian. In both stories the heroes stand upon the beach lamenting their unhappy fate, when they espy a poor fisherman. The fisher is a good fellow, of a gentle heart, who feeds and clothes the unfortunate hero and directs him to enter the city (thus in *Godfrey of Viterbo*, *Pericles* and the Italian and elder Greek versions of the Apollonius).

---

[1] As in Huon of Bordeaux. It is the familiar legend of Charlemagne pursuing a vassal who has killed his son.

[2] Cf. Modersohn, *Die Realien in Amis und Amiles und Jourdain de Blaivies*, Lingen, 1886, p. 37.

Jourdain spends the night with the fisher, apparently that the contest in which he is to engage may take place after matins, and perhaps also for the sake of the picture of the minster and the royal party issuing from it. Thus the evening meal of the Latin and all other versions becomes a morning meal.

While in *Apollonius* the hero displays great skill in ball playing, in *Jourdain* the sport is fencing. The king exclaims: "Who will fight with me?" ("qui vueult iestre mes pers a' l'esquermie"). Jourdain undertakes to resist him, and astonishes the king with his skill. After the sport Jourdain is left alone, but the king sends a messenger to him, who finds him weeping and at first inclined to think the king's invitation a mockery because of his squalid appearance.

The king's daughter, Oriabel, is attracted by the handsome youth, and believes him, because of his beauty and manly bearing, to be of gentle blood (see verses 1408–1414). She begs permission of her father to give clothes to the unknown. He replies, "Ma belle fille gel voil et si l'otroi . . . . Quant la pucelle entendit de l'anfant. Que li porroit donner le garnement." She sends him a splendid robe and waits upon him at the ablutions before the meal; and he, by reason of his modesty, becomes the favorite of the king and the beloved of Oriabel ("et la pucelle l'en ama plus trois tans"). In *Apollonius* the princess is not present at the ball play, but appears at the meal which follows it, and the dejected Apollonius is drawn to the banquet by the king and consoled. The princess asks her father who the stranger is, and goes herself to him and inquires his history.

One day Jourdain gives way in the orchard to his grief. He is overheard by the princess, who discovers his secret. Apollonius is overheard by the king playing upon his harp and bemoaning his fate (so in Copland and Wilkins). It has been remarked (Singer, p. 21), that there is here a trace of the influence of a group of märchen in which a hero enters the service of a king, and is surprised in his secret meditations in the garden by the king's daughter.

A number of parallel tales are to be found in J. G. von Hahn's *Griechische und albanesische Märchen*. Similarly in *Karlmeinet* and *Gran Conquista* (Bartsch, p. 17)[1] Karl reveals his high lineage alone and lamenting.

---

[1] Singer, p. 21.

The romances differ in the union of the lovers. The pacific character at this point of the *Apollonius* narrative will be recalled—how Apollonius instructs the princess in music, and is chosen by her as her husband, though she is sought in marriage by lofty suitors. The French epic is more turbulent and clamorous. At an incursion of the Saracens, Jourdain is armed by the king's daughter, is dubbed a knight and engages the chief of the enemy, Brumadant, whom he slays, and brings his head as a bridal gift to Oriabel, whom he marries.[1]

Apollonius resolves to return to Tyre, when he learns of the terrible fate of Antiochus and his daughter. Jourdain longs to see his foster-father, Renier, whom he hopes to find living upon the isle of Mekka or Mesques.

Jourdain's wife insists upon accompanying her lord in his sea voyage. Like the wife of Apollonius, she is pregnant, and during a storm is delivered of a child, whereupon—an interesting divergence from the ancient story—she is thrown alive and conscious into the sea. The priests advise this horrible act, which is again a consequence of the medieval belief that the sea would suffer no wounded body (the body of Oriabel is lacerated) to remain upon or within it. Jourdain fights with the sailors, but is overpowered by them, and the body of the queen, as in the elder story, is thrown into the sea.[2]

In the Christian French story, the resuscitation of the apparently dead is not accomplished by a physician skilled in the healing art, and by no commonplace application of cotton and heated oil. Oriabel is washed ashore at Palermo (Palerne, as the poem has it), and is discovered by the bishop of that city, who, as he observes the comatose body, remembers a precious ointment which had been sent to him from the Orient, whence come all rare and costly things. It is the same ointment with which Christ was anointed (dex en ot oingt les flaus et les costez). Oriabel revives at the touch of this sacred salve, relates her history, and becomes a recluse in a little house by the minster.

---

[1] In the old French prose version the princely wooers from Cypress and Hungary are rejected. They declare war. The princess asks Apollonius if he can fight. In the battle he distinguishes himself and saves the old king.

[2] "Die Erklärung der Stelle, die R. Schröder (*Glaube und Aberglaube in den Afr. Dichtungen*, S. 129) gibt, ist unrichtig und sein Verweis auf die Magdalenenlegende hilft nicht weiter, da die Frau dort wirklich tot ist und nur durch ein Wunder erweckt wird. Immerhin ist die Parallele interessant: auch dort (*s. Roman. Forsch.*, iv, 493, ff.; Passional ed., Hahn, 379, 28 ff.) gebiert eine Frau auf einem Schiffe ein Kind und stirbt an der Geburt, die Winde wachsen zu Stürmen an, die Marner verlangen von dem Ehemann dass er den Leichnam überbord werfe, denn so lange dieser auf dem Schiffe sei, würden sich die Winde nicht legen" (Singer, p. 23).

"Cil chapelain ont lor livres tenus,
Que por la damme, qui acouchie fu,
Lor est cist maus de la mer avenus,
Que mers ne sueffre arme qui navre fust
Qui en cors soit ne navrez ne ferus" (*J. de B.*, 2154).

The story has here made a long journey from its pagan Greek prototype. Bishops, nuns, priests and minsters have taken the place of the temple of Diana and the physician Cerimon. A like transformation we have seen to occur in the Spanish and modern Greek versions.

The fate of Tharsia takes a somewhat different appearance in the French poem. Jourdain, after the storm in which his wife was thrown overboard, comes to King Cemaire, who reigned in Orimonde (Tharsus) (and who corresponds to Stranguillio). Here his daughter is baptized and named Gaudisce. Jourdain commits her to the care of one Josselme (the counterpart of Theophilus), and departs to seek his queen. He sails by Tunis and the Nile, and at last reaches Palermo, where he finds his wife. He relates to her his adventures in a much briefer way than does Apollonius in the elder story. After he has found Oriabel and Renier, the story returns to Gaudisce. The king of Orimonde had a daughter who was far outshone in beauty and in grace by Jourdain's daughter. The queen's envy was violently aroused, and Josselme is ordered secretly to remove Gaudisce. Under the pretense of conducting her to her father he brings her to Constantinople, when, saying, "I commend thee to God," he abruptly leaves her:

> "Gentiz pucelle, a Jesu tæ conmant,
> Qui d'encombrier gart ton cors avenant "[1] (3161).

Gaudisce, left alone with her nurse, Floriant (Lycorides), realizes her desertion and becomes desperate.

The treachery and brutality of the scene in the bordello are also made less revolting in the French poem. The son of the king of

---

[1] In the Latin version Tharsia is to be murdered on the shore; only in *Pericles* and the Greek märchen does she accompany the traitor.

Constantinople becomes enamoured of the beauty of Gaudisce, but she rejects his suit, and will approach no man, nor listen to words of affection until she finds her father. The king, dismayed at the melancholy of his son, orders Gaudisce to be offered in a brothel. At this moment her parents fortunately arrive. They had first proceeded to Orimonde, where Josselme, dismayed at the arrival of Jourdain, confesses that he had conveyed Gaudisce to Constantinople, whither Jourdain immediately holds his course. He learns upon his arrival that a woman is to be offered for sale, and his daughter comes at once into his mind. He finds no rest until he offers protection to the unknown unfortunate and recognizes in her his daughter. She marries Alis, the son of the king of Constantinople. They all return to France to be reconciled to Charlemagne. The usurper and murderer, Fromont, is conquered in field fighting by Jourdain, and condemned to be flayed alive and to be dragged to death by a horse. The faithful Renier is rewarded with the city of Blaivies, just as Hellenicus is remembered in the *Apollonius*.

It will be seen that in *Jourdain* the finding of the wife does not conclude the story. Oriabel hears Jourdain lamenting before her cell in Palermo. She thinks she recognizes the voice, and calls him to her window. Mutual recognition follows, and the Bishop dismisses her from her cloistral life.

The story of *Jourdain de Blaivies* is often found associated with the tale of *Amis et Amiles* and both were ultimately inserted in the Charlemagne cycle, Jourdain's father becoming the son of Amis. See also *Deux Redactions du Roman des Sept Sages de Rome*, published by Gaston Paris, Paris, 1876, pp. 161–196, for a discussion of a variation of the *Romance of the Seven Sages* in which the two friends are named Loys and Alexander. This latter story seems to be the foundation of Theodoor Rodenburgh's *Alexander*, a tragi-comedy in forty-four scenes, published at Amsterdam in 1618. Henslowe paid Martin Slaughter in May, 1598, £8 for five books, one of which was a play of *Alexander and Lodwick.* Mr. W. C. Hazlitt believes that this lost play was in some degree like the Dutch tragi-comedy.

Orendel, the hero of the poem which Berger has edited, is the son of Eigel. The name is found in Franconian and Bavarian from the eighth to the eleventh centuries and appears in its earliest form in Lombardy as *Auriwandalus,* which corresponds linguistically with *Aurvandill* or *Horvandillus.* The name, as Müllenhoff points out, indicates a seafarer (Norse *Aurr*, A.-S. *ear*, moisture —Lat. Aqua). Orendel is the son of Ougel or Oügel, who must have been the central figure of a sailor myth. Singer supposes the name to be derived from that of one of the rejected suitors of the daughter of Archistrates, called Ardaleo or Ardaleon in the Latin *Historia Apollonii.*

Singer indulges in some bold speculation in his effort to account for "Orendel, son of Eigel." He remembers that in Vienna Codex 3332 the unsuccessful suitor is called Ardonius, as in Velser and the *Gesta*, and in the Spanish *Libre de Apolonio* he is named Aguylon, and Singer supposes that the Spanish may be a mutilated form and may lead back to *Artigilon* (of the middle German prose). He then imagines that Ardonius Agilon came to stand together, so that the French version, leaning upon domestic names, and mistaking the second form to be a genitive, converted it into Arondeus fils Aiglon, and the German poem in turn transmuted it into "Orendel, Künec Eigels sun." Similarly Singer supposes Jourdain to be a corruption of Ardonius, perhaps by attraction to St. Jordan who in 1236 suffered shipwreck on his way to Palestine. The names of the characters in this world-traveled tale have suffered in their journeys strange transformations and bewilderments. Apollonius becomes Perillie in Bohemian and Pericles in Shakespeare. Timoneda names the murderer Estrangilo (Stranguillio) and gives the real murderer's name to a senator, Teofilo (Theophilus).

Orendel in the poem is shipwrecked on his way to meet his bride, as Apollonius is in the Danish ballad. Notice the confusion between the daughter of Antiochus and the daughter of Archistrates. Orendel consults with his father concerning his purpose. Apollonius consults with his mother (according to the Danish ballad), or with his councilor (according to the Bohemian folks-book).

The mother and councillor dissuade Apollonius; the father encourages Orendel. The description of the departure of the vessel abounds with lively touches, after the manner of Dümmler's metrical Latin version. Huge quantities of food are taken on board, enough for eight years, in which there may be a reminiscence of the heavy freighing of the ship on the occasion of the second embarkation of Apollonius (to Tharsus) when he takes with him 100,000 bushels of corn.

A storm drives Orendel into the Klebermer (literally, *sticky sea*;

a traditional sea, possibly the Sargasso), where he is detained three years, until redeemed by divine help. So in Heinrich von Neustadt the fleet of Apollonius is driven upon the *Lebermer* (same as Klebermer) and detained a year, until the heathen gods chance to pass by and free the hero.

Orendel has a successful sea-fight with the fleet of the pagan king Pelian von Babilon, which corresponds in *Jourdain* with the surprise attack by the Saracens upon the sea. Doubtless both incidents grew out of the circumstance that in all the versions of the Apollonius story Antiochus equips a fleet that vainly pursues Apollonius after his solution of the king's riddle and his subsequent flight. In the old French prose version Antiochus prepares snares for Apollonius even *before* he comes to Antioch as a suitor, and sends out soldiers to destroy him. Curiously enough in Heinrich von Neustadt Thaliarchus, the *major domo* of Antiochus, fights with Apollonius, but is conquered in the duel.

It is easy to account, also, for the appearance in *Orendel* of the heathen king Pelian von Askalon, who craves possession of Orendel's bride, and threatens to hang Orendel on a gallows in the castle moat. No doubt this is the same Antiochus who desires to live in shame with his daughter and threatens to kill her suitors and impale their heads upon his castle wall.

Orendel is shipwrecked, lies three days in the sand, and then sees a fisherman approaching in a boat. In the Bohemian folksbook Apollonius swims three days and nights upon a log of wood, and on the fourth day he sees a fisherman in a boat. A similar situation is in the French prose romance. In *Jourdain* the fisher arrives in a boat, as also in the Danish ballad and the Cretan version. The fisher is old but robust—quendam robustum senem (Riese). The fisherman displays fear of Orendel, precisely as in the Danish ballad the fishers fear Apollonius (see p. 233). Orendel tells him that he is a shipwrecked fisherman. In some versions Apollonius refuses to tell his name. So in Godfrey, and Steinhöwel, and Shakespeare—"What I have been I have forgot to know."

In the French version he says he is a shipwrecked merchant; in Timoneda he is questioned by a bather, and he says he is a bañador from Tyre.

Orendel offers himself as a servant to the fisherman. In the Bohemian the fisher says, "Do you not know that having come out of the sea you are my serf? But God forbid that I should do you any harm!" The fisher takes Orendel into his boat (cf. *Pericles*, "Canst thou catch any fishes then?"), who prays God to help him for he cannot fish.[1] He casts out his net, just as in the Danish ballad Apollonius must fish, and even carry the fish-basket. Among the fish that are caught is one in whose stomach they find a gray coat. Blood stains are observed on it, which makes the fisher say that a slain prince wore it. The coat has the appearance of armour. Orendel entreats the fisher to give him the coat, but he refuses, and instead gives Orendel a pair of shoes and a mantle. The coat is sold to him later at a low price, and the fisher pretends that he has given it to him, and begs him if he shall have good fortune in the world not to forget the fisher who succoured him. He is also given a pair of stockings, but there is no word of a partition of the fisher's mantle.[2] In Wilkins' novel Apollonius even gets a blanket for his horse.

Orendel remains six weeks with the fisher and then goes to the city, where he is imprisoned, and released by an angel. He comes to Jerusalem and, asking after the meaning of a noise that fills the air, is told that the Knights Templar are tourneying. In the Latin text Apollonius learns from a herald. In *Pericles* the fishermen have instructed him in advance of a tournament which the suitors have instituted.

Orendel meets two pagans who are rivals for the possession of the queen. They are Merzian and Sudan. Merzian lends his horse to Orendel, who overthrows and kills Sudan, whereupon Merzian takes flight. In *Jourdain* the hero first tries his valor with King Marques, the father of the princess, and then conquers an enemy of the king (Sortin) in serious combat. Marques and Sortin, Merzian and Sudan, are evidently identical names, or names of common origin. Singer conjectures that Marques arose from *regem Archestratem!* In the Latin *Apollonius*, it will be remembered, there is ball play, and gifts by the king, and then the dismissal of three suitors. In Copland there are only two suitors (as in Steinhöwel, Bohemian and French). In the French story the suitors go to war, and are conquered by Apollonius. Only one of the suitors has a name—Ardalio[3]. Pericles buys a horse with a jewel, conquers five suitors, and in a later scene, Act ii, Sc. v, three more appear who are dismissed. In Wilkins, the king gives the hero, after his successful tourney, a horse and a pair of golden spurs.

---

[1] In the French and Spanish he declines smilingly the invitation to fish.

[2] The Bohemian and the Danish know nothing of the division of the cloak which the Latin speaks of. The Italian calls it "vestimento di Grigio."

[3] In Twine only have the other suitors names—Munditius and Camillus.

The queen sends a messenger to Orendel to summon him to her presence. The messenger at first hesitates to go, awed by the terrible appearance of Orendel. When at last he obeys the queen's command and delivers her message, Orendel, like Apollonius, believes that he is mocked and made sport of because of his shabby clothes.

His path is beset with perils. The Knights Templar attempt to kill him; at the court of the king he finds an envious old man who calumniates him.

Battles with giants follow. He fights with Mentwin and Merzian. The queen asks him if he is not King Orendel. He replies that he is only a poor pilgrim. She calls him Mr. Graycoat, for she cannot learn his real name. In battle with the giant Pelian he utters his own name aloud (like Rustum), and the Knights Templar, realizing that he is indeed a king, worship him, and the queen exclaims, "Now I am indeed happy that I have always been faithful."

After the scene in which the fisher is rewarded, which is commented upon elsewhere, the combat for Westphal follows, at which siege Orendel by means of a grappling hook is pulled over the wall and captured. A somewhat similar scene is in *Jourdain*, and in Heinrich von Neustadt there is a naval battle between Apollonius and Absalon, in which the latter is drawn by a grappling hook into the hostile vessel.

Orendel is called home by an angel to protect his kingdom against the pagans. In the French the kingdom in question is the hereditary kingdom of Apollonius: Antiochus is merely a satrap who wrongfully kept it from him. In Timoneda and *Pericles* the kingdom is Tyre, which in Timoneda has been usurped by Taliarca, while in *Pericles* an insurrection is threatened.

Orendel at first thinks to return alone, but Bride (his queen) is resolved to journey with him. She proposes to make the fisher a ruler in their absence, but the fisher refuses and all three depart together. In Timoneda the fisher is master of the galleys to Apollonius, and is finally made Viceroy of Tyre. Upon the voyage the queen falls into a trance and is thrown into the sea in a chest. She is found by Daniel and Wolfhart and brought to the pagan King Minolt. With the help of the fisher Orendel rescues her.

Again Durian brings her to the pagan King Wolfhart, but Durian, himself, helps her to preserve her chastity. It is interesting to note the confusion here, and to see the queen playing the rôle which the Latin *Historia* assigns to the daughter. The scenes here correspond to the scene in the brothel. In the second scene Wolfhart (Singer suggests, p. 15) is a translation of Lupanar, and Durian takes the place of Villikus, who is to deprive the queen of virginity, but he figures in the light of a protector, and in Heinrich is called Turpian (or Turian, as it is in a Spanish romance related to the Jourdain).

The Danish ballad has already been described and its correspondence to Jourdain indicated. The home of King Apolonn in the ballad is Naples. The emperor, who at one time represents Antiochus and at another Archistrates, lives in Speier. He has a daughter whom he rates at the sea's worth, and thinks no one worthy of her save Apolonn. She writes a secret letter, in which she confesses her love for him, as the daughter of Archistrates does in the Apollonius story. The emperor now bewitches the shore of his kingdom so that Apollonius is shipwrecked there. To this end he commands the aid of twelve *troldquinner*, as in the *Fridthiofsage* Helgi makes use of two witches for the same purpose (Singer, p. 31). All the mariners are lost save Apolonn only, who retains his lyre. (The remainder of the story is as upon page 233.)

The riddles form an extremely interesting and important part of the Apollonius story. They incline to the Salomon-Markolf type of romance. Kemble's introduction to the Anglo-Saxon *Salomon and Saturnus*[1] is still a classic chapter in the history of this curious and universal literary type. Schaumberg's "Salomo und Markolf" in Paul and Braune's *Beiträge*, ii, 1, and Vogt, *Die deutschen Dichtungen von Salomon und Markolf*, illustrate the mythic dignity of character which originally belonged to the *disputatio*. This legendary stock, as Prof. Earle says, sent its branches into all the early vernacular literatures of Europe. From a rabbinical root, the strange legend in which at first Solomon and Hiram, King of Tyre, exchanged hard questions, and in which at a later time Solomon and Mercury, and Solomon and a "Chaldean Earl" dispute seriously, develops into a mocking form of literature in which religion is a burlesque and the poet a buffoon.

---

[1] *The Dialogue of Salomon and Saturnus*, with an historical introduction by J. M. Kemble, London, 1848.

King Hiram of Tyre helps in the building of Solomon's temple (see 1 Kings v. 1). Solomon sends a messenger to Hiram, demanding, "Send me a learned man," and Hiram replies, "I have sent to thee a prudent and wise man (a cunning man indued with understanding) of Hiram my father's" (2 Chron. ii. 13) [misi ergo tibi virum prudentem et scientissimum Hiram patrem meum]. The Vulgate here merely translated the half name. *Chiram Abi* (Heb.) signifies literally "my father noble born," and so *Churam abiv* is equivalent to "his father is noble born." According to the Vulgate the passage (2 Chron. ii. 13) would seem to mean that the architect Hiram was the father of King Hiram, and then again the father of Solomon. In close connection with this passage is the famous description of the wisdom of Solomon (1 Kings iv. 29–34): "Dedit quoque Deus sapientiam Solomoni, et prudentiam multam nimis et latitudinem cordis quasi arenam, quæ est in litore maris. Et præcedebat sapientia Salomonis sapientiam omnium orientalium et Ægyptiorum, et erat sapientior cunctis hominibus, sapientior Ethan, Ezrahita et Heman, et Chalcol et Dorda, filiis Mahol, et erat nominatus in universis gentibus per circuitum. Locutus est quoque Salomon tria millia parabolas, et fuerunt carmina ejus quinque et mille et *disputavit super lignis a cedro*, quæ est in Libano, usque ad hyssopum quæ egreditur de pariete et disseruit de jumentis et volucribus et reptilibus et piscibus, et veniebant de cunctis populis ad audiendam sapientiam Salomonis et ab universis regibus terræ, qui audiebant sapientiam ejus."

In this Biblical Mahol Hofmann sees the later romantic Marcol, Marcolf, Morolf, who disputes with Solomon in riddles. And he adds, "Wenn man erwägt, wie gewaltig die Namen des alten Testamentes in der Septuaginta, Vulgata, bei Flavius Josephus und sonst verändert werden, so wird die Verwandlung von Mahol (Machol) in Marcol, vielleicht unter Einwirkung von Chalcol, nicht besonders auffallen."

The saga made an ambassador of this King of Tyre who competed with Solomon in riddles, and who on the one hand occupies the place of the architect, Hiram Abi, and on the other that of Marcol and his sons. This myth developed in the first century after Christ and is mentioned by Josephus (Bk. viii, Chap. v) after Menander who translated the Tyrian originals out of Phœnician into Greek. After the death of Abibal, says Josephus, his son Hiram succeeded. At this time the youngest son of Abdemon lived, who always solved the riddles which Solomon proposed. Dion says Solomon sent riddles to Hiram and received some from him. Whoever could not find the answers was to pay money to him who was successful. Hiram failed and was obliged to pay a heavy fine. However, he learned the answer to the riddle from Abdemon, a Tyrian, who also gave other riddles to Solomon which he could not answer, and so was compelled to forfeit to Hiram. This Abdemon or his son is the Hiram Abi of the Bible, and in two MSS. he is called *'Αβινος*. (It has been suggested that we have here the original source of Bürger's ballad of the king and the abbot of St. Gall, and of Schiller's *Teilung der Erde.*)

At the end of the fifth century this history first appeared in western literature. The decree of Damasus, or Gelasius, the first index librorum prohibitorum, mentions among other notable books the *Contradictio Salomonis*, which was withdrawn from the Canon because of its deviation from the Scriptural narrative. The *Salomon-Markolf* was in Germany in the tenth century, for it is quoted by Notker, of St. Gall. It is not improbable that the Proverbs in the St. Gall Rhetoric are taken from the St. Gall Salomon-Markolf. In the twelfth century, Bp. William of Tyre recognized the identity of the Salomon-Abdemon story with the Salomon-Markolf story. By a change of names and localities a second type of myths appeared, in which a princess is wooed by riddles with risk of life to the unfortunate suitors. Here we have the Antiochus type. A very early indication of this condition is to be found in Tatian, *Oratio ad Græcos*, cap. 68, where Salomon and Hiram are shown to be brothers-in-law, and, according to the Phœnician histories of Theodotus, Hypsicrates and Mochus, it is reported that Chiram has given his daughter to Solomon in marriage.

The change of the scene of the history from Jerusalem to Antioch points to the time when Jerusalem, conquered for the second time, had ceased to exist, and had even disappeared as a name, its site being occupied by a Roman colony, Aelia Capitolina, while Antioch had become the chief city of Syria. The middle link between Machal and Markolf is Marcol, the Hebraized name of Mercury, which could only have become known to the Jews after the Roman conquest of Palestine (see B. Stentz, *Die Hiram Sage, Handschrift für Brüder Meister*, Berlin, 1871).

The figures of Christian and pagan literature and mythology often proceed in medieval romance in strangely assorted companies. Solomon and Mercury seems an oddly chosen companionship. In the stories of Solomon we find him frequently engaging in conflicts with djinns or demons. He overpowers and holds in subjection all but Sachr (or Asmodeus), whom he finally conquers by artifice and from whom he learns how to obtain possession of the worm Schamir which cuts stones without noise—an obvious reminiscence of the building of the temple of Solomon, without the sound of a hammer ("like a tall palm the silent temple grew"). With the conception of Solomon as the wisest and most eloquent of men and the most powerful conqueror of spirits, there must have come a moment in the evolution of the story in which he would measure his prowess with the demons of the classic world. Mercury excelled in discourse. It was therefore but natural that with him Solomon should enter into argument. When Paul and Barnabas preached in Lystra, the people cried, "The gods have come down to us in the likeness of men," and they called Barnabas, Jupiter, because of his stature, and Paul, Mercury because of his eloquence.

In the Vienna Apollonius, MS., 480, occurs the following note:

"Nota quod de isto Apollonio tyro magister in scolastica ystoria in libro tercio regum in rubrica de opidis datis yram a Salomone. Testatur Josephus Menandrum fenicem ystoriographum scripsisse quod Salomon et yram mutuo sibi scripserunt enigmata et figuras quod qui non solueret tercam daret alteri pensionean cumque artaretur yram in solucione conpelebat tyrum juvenem abdimum abdemonis filium qui omnino de facili explicabat."

A deeply interesting theory, set forth with much learning and ingenuity by A. Vesselovsky—*Iz istorii literaturnavo obstchenia vostoka i Zapada, Slavianskaia Skazania. Solomonge i Kitovrase i Zapadnya legendy o Marolfe i Merline*, St. Petersburg, 1872—seeks to identify Markolf with Merlin, and so associate the ancient *disputatio* with the Celtic story of Arthur. In Elie de Saint-Giles (early thirteenth century) the abduction of Solomon's wife as narrated in Solomon and Markolf is described, and the names of Arthur, Gawain and Mordred appear.

Arnold de Guisnes, Chronique de Guisnes et d'Ardres, par Lambert, curé d'Ardres ed. par le Marquis de Godefroy Menilglaise, Paris, Renouard (1855, C xcvi, pp. 215–217) reads "cognatum suum Walterum de Clusa nominatum, qui de Anglorum gestis et fabulis,

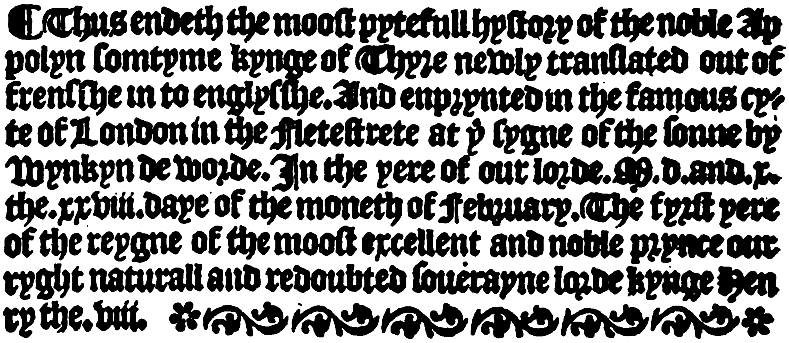
de Gormundo et Isembardo, de Tristanno et Hisolda, de *Merlino* et *Merchulfo*, et de Ardentium gestis diligenter edocebat." Prof. Vesselovsky concludes, "Our comparison of Merlin with Asmodeus-Kitovras, and the type of Morolf, has shown us that the legend of Merlin is more archaic than the German poem of Solomon and Morolf, and more nearly approaches the Talmudic-Slavonic legend" (p. 331).[1]

The universal popularity and wide circulation of the tale of Apollonius of Tyre is further illustrated by the *Thidrik-Saga*, in which Apollonius appears, and by the *Vilkina-Saga*, in which King Artus of Bertangaland has two sons, named Iron and Apollonius, the latter of whom was appointed by Attila, Jarl of Tyre (see P. E. Müller, *Saga Bibliothek*, ii, 209).

The explanation of the firm hold that this story has had upon so many centuries and peoples is a tempting subject of philosophical study. It comes to us stained through and through with medieval legend and superstition. As ancient Gower says in the play:

> "It has been sung at festivals,
> At ember eves and holy ales,
> And lords and ladies in their lives
> Have read it for restoratives."

COLOPHON TO WYNKYN DE WORDE.



¶ Thus endeth the mooſt pytefull hyſtory of the noble Ap
polyn ſomtyme kynge of Thyre newly tranſlated out of
frenſſhe in to englyſſhe. And enprynted in the famous cy-
te of London in the Fleteſtrete at yͤ ſygne of the ſonne by
Wynkyn de worde. In the yere of our lorde. M.D.and.x.
the.xxviii.daye of the moneth of February. The fyrſt yere
of the reygne of the mooſt excellent and noble prynce our
ryght naturall and redoubted ſouerayne lorde kynge Hen
ry the.viii.

THE END.

---

[1] F. Liebrecht (*Zur Volkskunde*, pp. 346–348) discusses the name Marcolf and its relations (?) to Merlin and Moloch.

APPENDIX.

THE GESTA ROMANORUM TEXT.

De Antiocho qui filiam propriam cognovit et tantum eam dilexit, quod nullus eam in uxorem habere potuit nisi problema ab eo propositum solveret.

Antiochus in civitate Antiochia regnavit, a quo ipsa civitas Antiochia nomen accepit. Ex conjuge sua filiam speciosissimam genuit. Que cum pervenisset ad etatem legitimam et species pulchritudinis accresceret, multi eam in matrimonium petebant cum magna et inestimabili dotis quantitate. Sed cum pater deliberaret, cui potissime filiam suam daret in matrimonium, nescio qua iniqua concupiscentia crudelitatisque flamma in amorem filie sue exarsit cepitque eam amplius diligere quam patrem opporteret. Qui cum luctatur cum furore, pugnat cum pudore, vincitur amore. Quadam die accessit ad cubiculum filie sue et omnes longe secedere jussit, quasi cum filia sua colloquium secretum habiturus. Stimulante furore libidinis diu repugnante filia nodum virginitatis erupit. Cumque puella quid faceret cogitaret, nutrix subito ad eam intravit. Quam ut vidit flebili vultu, ait: "ob quam rem affligitur anima tua?" Puella ait: "o carissima, modo hic in cubiculo duo nobilia nomina perierunt." Ait nutrix: "domina, quare hoc dicis?" Ait illa: "quia ante matrimonium meum pessimo scelere sum violata." Nutrix cum hec audisset et vidisset quasi amens facta est et ait: "et quis diabolus tanta audacia virginis thorum et regine ausus est violare?" Ait puella: "impietas fecit hoc peccatum." Nutrix ait: "Cur non indicas patri?" Puella ait: "et ubi est pater? Si intelligis, peribit nomen patris in me; mortis mihi remedium placet." Nutrix ut audivit eam mortis remedium querere, blando eam sermonis colloquio revocavit, ut a proposito suo recederet. Inter hec impius pater, cum simulata mente ostenderet civibus pium patrem, inter domesticos parietes maritum se filie letatur. Et ut semper impiis filie thoris frueretur, ad expellendos petitores, qui eam in conjugem petebant, novum genus nequicie cogitavit. Questionem vero proponebat, dicens: "si quis questionis mee solucionem invenerit, filiam meam in uxorem habebit, et si defecerit, decollabitur." Plurimi undique reges et principes patrie propter incredibilem et inauditam puelle speciem venerunt. Et si quis forte prudentia litterarum questionis solucionem invenisset, quasi nihil dixisset, decollabatur, et caput eius supra portam suspendebatur, ut advenientes imaginem mortis viderent et turbarentur, ne ad talem condicionem accederent. Hoc totum fecerat, ut ipsemet cum filia sua in adulterio poterat permanere. Cum vero tales crudelitates exerceret Antiochus, interposito brevi temporis spacio adolescens quidam Tyrus, patrie sue princeps locuples valde, Appollonius nomine, bene litteratus, navigans Antiochiam intravit, ingressusque ad regem ait: "ave rex!" Et ille: "salvi sunt nupturi parentes tui?" Ait juvenis:

"peto filiam tuam in uxorem." Rex ut audivit, quod audire nolebat, respiciens juvenem ait: "nosti nupciarum condicionem?" Ait juvenis: "novi et ad portam vidi." Indignatus rex ait: "audi ergo questionem: Scelere vehor materna carne vescor, quero fratrem meum, matris mee virum; nec invenio." Puer accepta questione paululum recessit a rege et, cum scienciam quereret, deo favente solucionem questionis invenit et reversus ad regem ait: "bone rex, proposuisti questionem, audi ergo solucionem nam quod dixisti 'scelere vehor' non es mentitus; te enim ipsum intuere. 'Materna carne vescor': filiam tuam respice!" Rex ut audivit solucionem questionis juvenem solvisse, timens, ne peccatum suum patefieret, irato vultueum respiciens ait: "longe es, juvenis, a questione, nihil verum dixisti. Decollari quidem promerueris, sed ecce habebis dierum triginta spacium: recogita tecum, revertere ad terram tuam! Et si questionis solucionem inveneris, filiam meam in matrimonium accipies; sinautem decollaberis." Juvenis turbatus accepto comitatu navem ascendit, tendens in patriam Tyrum. Sed post recessum adolescentis vocavit rex dispensatorem suum, Thaliarchum nomine, cui ait: "Thaliarche secretorum meorum minister fidelissime, scias, quod Tyrus Apollonius invenit questionis mee solucionem. Ascende ergo confestim navem ad persequendum eum. Et cum perveneris Tyrum, quere eum et cum ferro vel veneno interfice! Reversus dum fueris, premium magnum accipies." Thaliarchus statim sumens pecuniam simul peciitque navem, venit ad patriam juvenis. Appollonius vero prius venit et domum suam introivit, apertoque scrinio omnes libros respexit. Et nihil aliud invenit, nisi quod regi dixerat, et dixit intra se: "nisi fallor, Antiochus rex impio amore diligit filiam suam." Et recogitans secum dixit: "quid agis Appolloni? Questionem regis solvisti, filiam ejus non accepisti: ideo delatus es a deo, ut non morieris." Continuoque jussit sibi naves preparare et eas centum milibus modiorum frumenti onerari et multo pondere auri et argenti et veste copiosa. Et cum paucis secum fidelissimis hora noctis tercia navim ascendit, tradiditque se alto pelago. Alia vero die queritur a civibus suis et non invenitur. Meror ingens nascitur, quod amantissimus princips patrie nusquam comparuit; planctus magnus erat in civitate. Tantus vero amor civium circa eum erat, ut multo tempore tonsores cessarent, publica spectacula tollerentur, balnea clauderentur; non templa, non tabernas quisquam ingreditur. Et cum talia agerentur, supervenit Thaliarchus, qui a rege Antiocho ad necandum eum missus fuerat. Et videns omnia clausa dixit cuidam puero: "indica mihi, si velis vivere, ex qua causa civitas hec in luctu moratur?" Ait puer: "o bone, nescis tu illud? Civitas hec in luctu moratur, quia Appollonius princeps patrie huius at Antiocho rege regressus nusquam comparuit?" Thaliarchus cum hoc audit, gaudio plenus ad navem rediit et Antiochiam intravit. Ingressusque ad regem ait: "domine mi rex, letare, quia Appollonius vos timens nusquam comparuit. Rex ait: "fugere quidem potest, sed effugere non potest." Statim hujusmodi edictum posuit: "quicunque Appollonium Tyrum, contemptorem regni mei, mihi exhibuerit, accipiet quinquaginta talenta auri, qui vero caput eius, centum accipiet." Hoc facto non tantum inimici sed amici cupiditate seducti ad persequendum Appollonium properabant. Querebatur vero Appollonius per mare, per terras, per silvas, per universas indagines et non inveniebatur. Tunc rex jussit sibi classes navium preparari ad persequendum juvenem; sed et moram facientibus, qui classes navium sibi preparabant, Appollonius Tharsum devenit. Et deambulans juxta litus visus est a quodam cive suo Elamico nomine, qui supervenerat in ipsa hora. Et accedens ad eum dixit: "ave, rex Appolloni!" Ille salutatus fecit, ut potentes facere consueverant: sprevit hominem plebeium. Tunc senex indignatus est valde et iterum salutavit eum et ait: "ave Appolloni! Resaluta et noli despicere paupertatem honestis moribus decoratam! Si enim scis, quod scio, cavendum est tibi." Et ille: "si placet, dicito mihi!" Qui ait: "prospictus es." Et ille: "et quis patrie sue proscripsit principem?" Elamicus ait: "rex Antiochus." Appollonius: "qua ex causa?" Elamicus ait: "quia, quod pater est, tu esse voluisti." Appollonius ait: "et pro quanto me proscripsit?" Et ille: "ut quicunque te illi vivum exibuerit, quinquaginta talenta auri, qui vero caput tuum protulerit, centum accipiet. Et ideo moneo te: fuge in presidium." Sed cum hec dixisset Elamicus, discessit. Tunc Appollonius eum rogavit, ut ad se veniret, et centum talenta auri ei daret. Et ait: "accipe tantum de paupertate mea, quia meruisti; et amputa caput meum et regi presentes et tunc gaudium magnum habebit. Ecce habes centum talenta auri et tu es innocens, quia te conduxi, ut gaudium offeras regi." Cui senex ait: "domine, absit hoc a me, ut hujusmodi rei causa premium accipiam! Apud bonos homines amicicia premio non est comparanda." Et valedicens discessit. Post hec Appollonius cum spaciatur in eodem, loco supra litus, vidit hominem contra se venientem, dolentem et mesto veltu, Stranguilionem nomine. Accessit ad eum protinus, ait Appollonius: "ave, Stranguilio!" Et ipse ait: "quare in his locis turbata mente versaris?" Appollonius ait: "quia filiam ejus (ut verum dixeram, conjugem) in matrimonium petivi. Itaque, si fieri potest, in patria vestra volo latere." Stranguilio ait: "domine Appolloni, civitas nostra pauperrima est et non potest tuam nolilitatem sustinere: preterea duram famem et sterilitatem patimur annone, nec etiam jam civibus ulla spes est salutis, sed crudelissima mors est ante oculos nostros." Appollonius ait: "agite gratias deo, qui me profugum vestris finibus applicuit. Dabo civitati vestre centum milia modiorum frumenti, si fugam meam tantum celaveritis." Stranguilio, ut hec audivit, prostravit se ad pedes ejus et ait: "domine Appolloni, si esurienti civitati subveneris, non solum fugam tuam celabimus, sed si necessitas fuerit, pro tua salute dimicabimus." Ascendensque Appollonius tribunal in foro presentibus cunctis civibus ejusdem civitatis dixit: Cives Tharsenses, quos annone penuria turbat et opprimit, ego Tyrius

Appollonius relevo. Credo enim vos, hujus beneficii memores, fugam celaturos. Scitote enim non me malicia Antiochi esse fugatum, sed vestra felicitate huc sum delatus. Dato itaque vobis centum milia modiorum frumenti eo precio, quo sum in patria mercatus: octo ereis singulos modios." Cives hec audientes, quod singulos modios octo ereis mercarentur, hilares effecti sunt ac gratias agentes statim frumenta portabant. Tunc Appollonius, ne deposita regia dignitate mercatoris magis quam donatoris nomen videretur assumere, precium, quod acceperat, ejusdem civitatis utilitatibus redonavit. Cives autem, ut tanta viderent ejus beneficia, bigam ejus in foro statuerunt, in qua stans dextra manu fruges daret et sinistro pede calcaret et in base scripserunt: "civitas Tharsia Tyrio Appollonio donum dedit, quod civitatem a seva fame liberavit." Deinde interpositis paucis diebus hortante Stranguilione et Dionysiade ejus conjuge ad Pentapolim Tyrenorum navigare proposuit, ut illic lateret, eo quod bene firma cum opulentia et tranquillitate agerentur. Igitur cum ingenti honore ducitur ad mare et valedicens omnibus ascendit ratim. Sed tribus diebus et noctibus totidem ventis prosperis navigans, subito est pelagus mutatum, postquam litus Tharsie reliquit. Nam paucis horis ventis concitatis, Aquilone vento Euroque instante clauso celo nimia se pluvia erupit. Populus Tiri procella corripitur, ratis pariter dissolvitur. Zephyri fretum perturbant, grando ac nubes tenebrosa incumbebant, flant venti fortiter intantum, quod mors cunctos occupat. Tunc unusquisque rapuit sibi tabulas. Tamen in illa caligine tempestatis omnes perierunt. Appollonius vero unius tabule beneficio in Pentapolitanorum litore est pulsus. Stans autem in litore nudus, intuens mare tranquillum sic ait: "o pelagi fides! Facilius incidam in manus crudelissimi regis! Quo pergam? Quam patriam petam? Quis notus huic ignoto auxilium dabit?" Hec dum loqueretur Appollonius, aspexit juvenem venientem contra se quendam, robustum piscatorem sordido sacco coopertum. Cogente necessitate prostravit se ad pędes ejus profusisque lacrimis ait: "miserere, quicunque es, succurre nudo naufrago, non humilibus natalibus genito! Et ut scias, cui miserearis: ego sum Tyrius Appollonius, patrie mee princeps. Deprecor te auxilium vite mee." Piscator, ut vidit speciem juvenis, misericordia motus erigit illum et duxit infra tecta domus. Posuit epulas, quas habere potuit, et ut plenius sue pietati satisfaceret, exuens se, tribunarium in duas partes dividens, unam dedit juveni dicens: "tolle quod habeo et vade in civitatem: forsitan invenies, qui tui misereatur. Si non invenies, huc ad ad me revertere! Paupertas quecunque sufficiat: piscemur simul. Illud tamen admoneo te, ut, si quando dignitati tue redditus fueris, ne despicias tribunarii paupertatem." Appollonius ait: "si non memor tui fuero, iterum naufragium paciar, nec tui similem inveniam!" Et hec dicens demonstrata sibi via ille carpens iter portas civitatis ingreditur. Dumque cogitaret, unde peteret auxilium vite, vidit per plateam puerum nudum currentem, oleo caput unctum, sabano precinctum, voce magna clamantem et dicentem: "audite, cives omnes! Audite peregrini et servi! Qui ablui vult, pergat gymnasium!" Audito hoc Appollonius exuens se tribunarium ingreditur lavacrum, utitur liquore. Et dum singulos intuetur, querit sibi parem nec invenit. Et subito Altistratus, rex totius regionis, ingressus est cum magna turba famulorum. Cum rex ludum spere cum servis suis exerceret, admisit se Appollonius regi et decurrentem sustulit speram et subtili velocitate percussam ludenti regi remisit. Tunc rex suis famulis ait: "recedite; hic enim juvenis, ut suspicor, mihi comparandus est." Appollonius, ut audivit se laudari, constanter accessit ad regem. Et accepto ciromate docta manu circumlavit eum cum subtilitate. Deinde in solio gratissimo fovit eum et exeunte eo ab officio discessit. Dixitque rex ad amicos suos post discessum adoles centis: "juro vobis in veritate, melius me nunquam abluisse quam hodie, beneficio adolescentis nescio cujus." Et respiciens unum de famulis ait: "juvenis ille, qui mihi officium fecit, vide, quis sit." Et ille secutus juvenem vidit eum sordido tribunario indutum. Reversusque ad regem ait: "juvenis ille naufragus est." Rex ait: "unde scis?" Et ille: "tacente illo habitus indicat causam." Ait rex: "vade celerius et dic ei: rogat te rex, ut venias ad cenam." Appollonius, ut audivit, acquievit et cum famulo venit ad regem. Famulus prior ingressus ait ad regem: "naufragus adest: sed propter sordidum habitum introire verecundatur." Statimque rex jussit eum indui vestibus dignis et ad cenam ingredi. Ingressus Appollonius triclinium regis contra regem assignato loco discubuit. Infertur prandium, deinde cena regalis. Appollonius cunctis epulantibus non epulatur, sed aurum et argentum in ministerio regis diu flens intuebatur. Tunc unus de discumbentibus ad regem ait: "nisi fallor, juvenis iste fortune regis invidet." Rex ait: "male suspicaris; nam mee fortune non invidet, sed plura se perdidisse testatur." Et respiciens Appollonium hilari vultu ait: "juvenis, epulare nobiscum et de deo meliora spera!" Et dum hortaretur juvenem, subito introivit filia regis, virgo jam adulta, deditque osculum patri, deinde cunctis discumbentibus amicis. Que dum oscularetur singulos, reversa est ad patrem et ait: "bone pater, quis est iste juvenis, qui contra te locum honoratum tenet, qui multum dolet?" Ait rex: "o dulcis filia, juvenis iste naufragus est et gymnasio mihi officio gratissime fecit, propter quod ad cenam vocavi illum. Quis autem sit, nescio. Sed si vis scire, interroga eum; te decet omnia nosse. Et forsitan, dum cognoveris, misereberis ei." Hec audiens puella ad juvenem accessit et ait: "carissime, generositas nobilitatem ostendit. Si tibi molestum non est, indica mihi nomen tuum et casus tuos!" Et ille: "si nomen queris, in mare perdidi; si nobilitatem, Tyro reliqui." Ait puella: "apertius dic, ut intelligam!" Tunc Appollonius nomen suum et omnes casus exposuit. Finitoque sermonis colloquio fundere lacrimas cepit. Quem ut vidit rex flentem, ait filie: "nata dulcis, peccasti: dum nomen et casus adolescentis petivisti, veteres ejus dolores renovasti. Ergo, dulcis filia, ex quo jam scis

lived, who always solved the riddles which Solomon proposed. Dion says Solomon sent riddles to Hiram and received some from him. Whoever could not find the answers was to pay money to him who was successful. Hiram failed and was obliged to pay a heavy fine. However, he learned the answer to the riddle from Abdemon, a Tyrian, who also gave other riddles to Solomon which he could not answer, and so was compelled to forfeit to Hiram. This Abdemon or his son is the Hiram Abi of the Bible, and in two MSS. he is called *’Αβινος*. (It has been suggested that we have here the original source of Bürger's ballad of the king and the abbot of St. Gall, and of Schiller's *Teilung der Erde.*)

At the end of the fifth century this history first appeared in western literature. The decree of Damasus, or Gelasius, the first index librorum prohibitorum, mentions among other notable books the *Contradictio Salomonis*, which was withdrawn from the Canon because of its deviation from the Scriptural narrative. The *Salomon-Markolf* was in Germany in the tenth century, for it is quoted by Notker, of St. Gall. It is not improbable that the Proverbs in the St. Gall Rhetoric are taken from the St. Gall Salomon-Markolf. In the twelfth century, Bp. William of Tyre recognized the identity of the Salomon-Abdemon story with the Salomon-Markolf story. By a change of names and localities a second type of myths appeared, in which a princess is wooed by riddles with risk of life to the unfortunate suitors. Here we have the Antiochus type. A very early indication of this condition is to be found in Tatian, *Oratio ad Græcos*, cap. 68, where Salomon and Hiram are shown to be brothers-in-law, and, according to the Phœnician histories of Theodotus, Hypsicrates and Mochus, it is reported that Chiram has given his daughter to Solomon in marriage.

The change of the scene of the history from Jerusalem to Antioch points to the time when Jerusalem, conquered for the second time, had ceased to exist, and had even disappeared as a name, its site being occupied by a Roman colony, Aelia Capitolina, while Antioch had become the chief city of Syria. The middle link between Machal and Markolf is Marcol, the Hebraized name of Mercury, which could only have become known to the Jews after the Roman conquest of Palestine (see B. Stentz, *Die Hiram Sage, Handschrift für Brüder Meister*, Berlin, 1871).

The figures of Christian and pagan literature and mythology often proceed in medieval romance in strangely assorted companies. Solomon and Mercury seems an oddly chosen companionship. In the stories of Solomon we find him frequently engaging in conflicts with djinns or demons. He overpowers and holds in subjection all but Sachr (or Asmodeus), whom he finally conquers by artifice and from whom he learns how to obtain possession of the worm Schamir which cuts stones without noise—an obvious reminiscence of the building of the temple of Solomon, without the sound of a hammer ("like a tall palm the silent temple grew"). With the conception of Solomon as the wisest and most eloquent of men and the most powerful conqueror of spirits, there must have come a moment in the evolution of the story in which he would measure his prowess with the demons of the classic world. Mercury excelled in discourse. It was therefore but natural that with him Solomon should enter into argument. When Paul and Barnabas preached in Lystra, the people cried, "The gods have come down to us in the likeness of men," and they called Barnabas, Jupiter, because of his stature, and Paul, Mercury because of his eloquence.

In the Vienna Apollonius, MS., 480, occurs the following note:

"Nota quod de isto Apollonio tyro magister in scolastica ystoria in libro tercio regum in rubrica de opidis datis yram a Salomone. Testatur Josephus Menandrum fenicem ystoriographum scripsisse quod Salomon et yram mutuo sibi scripserunt enigmata et figuras quod qui non solueret tercam daret alteri pensionean cumque artaretur yram in solucione conpelebat tyrum juvenem abdimum abdemonis filium qui omnino de facili explicabat."

A deeply interesting theory, set forth with much learning and ingenuity by A. Vesselovsky—*Iz istorii literaturnavo obstchenia vostoka i Zapada, Slavianskaia Skazania. Solomonge i Kitovrase i Zapadnya legendy o Marolfe i Merline*, St. Petersburg, 1872—seeks to identify Markolf with Merlin, and so associate the ancient *disputatio* with the Celtic story of Arthur. In Elie de Saint-Giles (early thirteenth century) the abduction of Solomon's wife as narrated in Solomon and Markolf is described, and the names of Arthur, Gawain and Mordred appear.

Arnold de Guisnes, Chronique de Guisnes et d'Ardres, par Lambert, curé d'Ardres ed. par le Marquis de Godefroy Menilglaise, Paris, Renouard (1855, C xcvi, pp. 215–217) reads "cognatum suum Walterum de Clusa nominatum, qui de Anglorum gestis et fabulis,

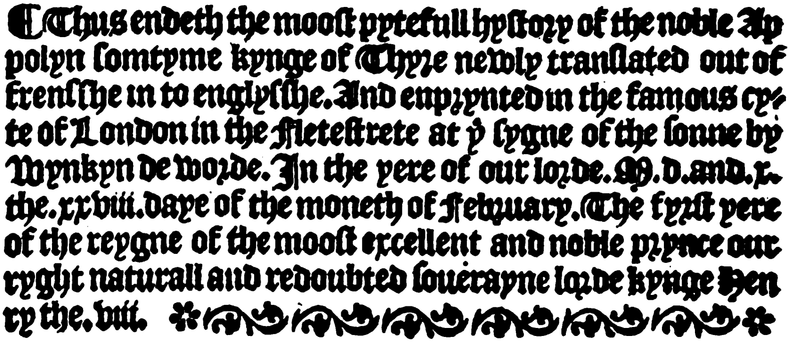
de Gormundo et Isembardo, de Tristanno et Hisolda, de *Merlino* et *Merchulfo*, et de Ardentium gestis diligenter edocebat." Prof. Vesselovsky concludes, "Our comparison of Merlin with Asmodeus-Kitovras, and the type of Morolf, has shown us that the legend of Merlin is more archaic than the German poem of Solomon and Morolf, and more nearly approaches the Talmudic-Slavonic legend" (p. 331).[1]

The universal popularity and wide circulation of the tale of Apollonius of Tyre is further illustrated by the *Thidrik-Saga*, in which Apollonius appears, and by the *Vilkina-Saga*, in which King Artus of Bertangaland has two sons, named Iron and Apollonius, the latter of whom was appointed by Attila, Jarl of Tyre (see P. E. Müller, *Saga Bibliothek*, ii, 209).

The explanation of the firm hold that this story has had upon so many centuries and peoples is a tempting subject of philosophical study. It comes to us stained through and through with medieval legend and superstition. As ancient Gower says in the play:

"It has been sung at festivals,
At ember eves and holy ales,
And lords and ladies in their lives
Have read it for restoratives."

COLOPHON TO WYNKYN DE WORDE.



¶ Thus endeth the mooſt pytefull hyſtory of the noble Ap
polyn ſomtyme kynge of Tyre newly tranſlated out of
frenſſhe in to englyſſhe. And enprynted in the famous cy-
te of London in the Fleteſtrete at yͤ ſygne of the ſonne by
Wynkyn de worde. In the yere of our lorde. M. D. and. x.
the. xxviii. daye of the moneth of February. ¶ The fyrſt yere
of the reygne of the mooſt excellent and noble prynce our
ryght naturall and redoubted ſouerayne lorde kynge Hen
ry the. viii.

THE END.

---

[1] F. Liebrecht (*Zur Volkskunde*, pp. 346–348) discusses the name Marcolf and its relations (?) to Merlin and Moloch.

APPENDIX.

THE GESTA ROMANORUM TEXT.

De Antiocho qui filiam propriam cognovit et tantum eam dilexit, quod nullus eam in uxorem habere potuit nisi problema ab eo propositum solveret.

Antiochus in civitate Antiochia regnavit, a quo ipsa civitas Antiochia nomen accepit. Ex conjuge sua filiam speciosissimam genuit. Que cum pervenisset ad etatem legitimam et species pulchritudinis accresceret, multi eam in matrimonium petebant cum magna et inestimabili dotis quantitate. Sed cum pater deliberaret, cui potissime filiam suam daret in matrimonium, nescio qua iniqua concupiscentia crudelitatisque flamma in amorem filie sue exarsit cepitque eam amplius diligere quam patrem opporteret. Qui cum luctatur cum furore, pugnat cum pudore, vincitur amore. Quadam die accessit ad cubiculum filie sue et omnes longe secedere jussit, quasi cum filia sua colloquium secretum habiturus. Stimulante furore libidinis diu repugnante filia nodum virginitatis erupit. Cumque puella quid faceret cogitaret, nutrix subito ad eam intravit. Quam ut vidit flebili vultu, ait: "ob quam rem affligitur anima tua?" Puella ait: "o carissima, modo hic in cubiculo duo nobilia nomina perierunt." Ait nutrix: "domina, quare hoc dicis?" Ait illa: "quia ante matrimonium meum pessimo scelere sum violata." Nutrix cum hec audisset et vidisset quasi amens facta est et ait: "et quis diabolus tanta audacia virginis thorum et regine ausus est violare?" Ait puella: "impietas fecit hoc peccatum." Nutrix ait: "Cur non indicas patri?" Puella ait: "et ubi est pater? Si intelligis, peribit nomen patris in me; mortis mihi remedium placet." Nutrix ut audivit eam mortis remedium querere, blando eam sermonis colloquio revocavit, ut a proposito suo recederet. Inter hec impius pater, cum simulata mente ostenderet civibus pium patrem, inter domesticos parietes maritum se filie letatur. Et ut semper impiis filie thoris frueretur, ad expellendos petitores, qui eam in conjugem petebant, novum genus nequicie cogitavit. Questionem vero proponebat, dicens: "si quis questionis mee solucionem invenerit, filiam meam in uxorem habebit, et si defecerit, decollabitur." Plurimi undique reges et principes patrie propter incredibilem et inauditam puelle speciem venerunt. Et si quis forte prudentia litterarum questionis solucionem invenisset, quasi nihil dixisset, decollabatur, et caput eius supra portam suspendebatur, ut advenientes imaginem mortis viderent et turbarentur, ne ad talem condicionem accederent. Hoc totum fecerat, ut ipsemet cum filia sua in adulterio poterat permanere. Cum vero tales crudelitates exerceret Antiochus, interposito brevi temporis spacio adolescens quidam Tyrus, patrie sue princeps locuples valde, Appollonius nomine, bene litteratus, navigans Antiochiam intravit, ingressusque ad regem ait: "ave rex!" Et ille: "salvi sunt nupturi parentes tui?" Ait juvenis:

cem Ligoridem nomine curam sue puelle custodire volo." Hec dicens tradidit Stranguilioni infantem deditque aurum et argentum et vestes copiosas. Et juravit neque barbam neque capillos nec ungulas tonsurum, nisi prius filiam suam dedisset in matrimonium. At illi stupentes, quod tam graviter juraverat, cum magna diligentia educaturos se puellam promittunt. Appollonius autem navim ascendit et ad longinquas Egipti regiones navigabat. Interea puella Tharsia expleto quinquennio traditur liberalibus studiis una cum Philomacia, filia eorum, coëtanea sua. Cumque ad XIIII annos venisset, reversa de auditorio invenit nutricem suam Ligoridem subitaneam invalitudinem incurisse et sedens juxta eam causas infirmitatis explorat. Cui nutrix: "audi, bona filia, verba mea et in corde tuo reserva. Quem tu putas patrem aut matrem vel patriam?" Ait puella: "patriam Tharsum, patrem Stranguilionem, matrem Dyonisiadem." Nutrix ingemuit et ait: "audi, filia, originem natalium tuorum, ut scias, quomodo post mortem meam agere debeas: est tibi pater nomine Appollonius et mater Lucina, Altistratis regis filia, que, cum te pareret, statim precluso spiritu mortua est. Quam pater tuus Appollonius effecto loculo cum ornamentis regalibus in mare misit, et viginti sistercias auri posuit sibi sub caput, ut, ubicunque esset devoluta, illa in auxilium ejus fuissent. Navis quoque luctantibus ventis cum patre tuo lugente et te in cunabulis posita pervenit ad hanc civitatum. Hiis ergo hospitibus, Stranguilioni et Dyonisiadi, una mecum te commendavit Tyrius Appollonius, pater tuus, votumque fecit nec barbam nec capillos nec ungues tonsurum, nisi prius te nuptum traderet. Nunc ergo moneo, si post mortem meam hospites tui, quos parentes appellas, iniuriam aliquando tibi forte fecerint, ascende in forum, et ibi invenies statuam patris tui, stantem. Apprehende illam et clama: "filia ejus sum cujus est hec statua." Cives vero, memores beneficiorum patris tui, injuriam tuam vindicabunt." Cui Tharsia: "cara nutrix, deum testor, si ita mihi non dixisses unde essem, penitus nescirem." Et cum adinvicem loquerentur, nutrix emisit spiritum. Tharsia vero corpus nutricis sue sepelivit et per totum annum mortem ejus lugebat. Post vero induit priorem dignitatem, petiit scolas ad studia liberalia. Et cum de scolis reverteretur, non prius cibum sumpsisset, antequam nutricis monumentum introisset. Ferens ampullam vini ingrediebatur et ibi manens parentes suos vocabat. Et cum hec agerentur, quadam die Dyonisiades cum filia sua Philomacia et Tharsia transibat per forum. Videntes omnes cives speciem Tharsie et ornamentum dixerunt: "felix pater, cujis filia Tharsia est! Illa vero, que adheret ei, turpis est et dedecus;" Dyonisiades, ut audivit Tharsiam laudari et filiam suam vituperari, conversa in insaniam furoris, sola sedens secum cogitavit: "pater eius ex quo hinc profectus est, habet annos XIIII: non venit ad recipiendum filiam suam nec letteras pro ea misit. Puto quod mortuus est—nutrix ejus mortua est: neminem habeo emulum. Occidam eam et ornamentis ejus filiam meam ornabo." Et cum hec cogitasset, venit quidam de villa nomine Theophilus, quem vocans ait: "si cupis premium accipere, Tharsiam interfice." Ait villicus: "quid peccavit innocens virgo?" At illa: "pessima est, et ideo mihi negare non debes. Fac, quod jubeo; et si non feceris, male tibi eveniet." Et ille: "dic mihi, domina, qualiter hoc potest fieri." Que ait: "consuetudo ejus est, mox ut venerit de scolis, non prius sumere cibum, quam nutricis sue introierit monumentum. Ibi te cum pugione paratum inveniat. Apprehende crines ejus a vertice et eam interfice et corpus ejus mitte in mare et libertatem tuam cum magno premio a me accipies." Villicus tulit pugionem. Gemens et flens ibat ad monumentum et ait: "heu, non merui libertatem nisi per sanguinis effusionem innocentis virginis?" Puella autem rediens de scolis monumentum cum ampulla vini intravit, sicut solebat facere. Villicus impetum fecit et apprehendens crines puelle jactavit eam in terram. Dum autem volebat eam percutere, ait ad eum Tharsia: "o Theophile, quid peccavi contra te vel contra aliquem, ut moriar:" Ait villicus: "tu nihil peccasti, sed pater tuus, qui te cum magna pecunia et ornamentis reliquit." Cui puello: "peto, domine, ut, si nulla est spes vite mee, permittas me deum testari." Villicus ait: "testare! Et deus ipse scit, quod coactus te interficio." Illa vero cum esset posita in orationem, venerunt pirate, et videntes puellam su jugo mortis stare et hominem armatum volentem percutere eam, clamaverunt: "parce, crudelissime barbare! Illa est nostra preda, non tua victoria." At ille, ut talia audivit, fugiens post monumentum latuit in litore maris. Pirate vero rapiunt virginem, mare petunt. Villicus rediit ad dominam et ait: "quod jussisti factum est; tu vero, ut consulo, induas te lugubrem vestem et ego tecum, et effundamus lacrimas falsas in conspectu civium et dicemus eam ex gravi infirmitate defunctam." Stranguilio ut audivit, tremor et stupor invasit eum et dixit: "da ergo et mihi vestem lugubrem, ut lugeam, quia tali scelere sum involutus. Heu, quid faciam! Pater puelle istam civitatem naufragium pertulit, bona perdidit et penuriam perpessus est, et restitutum est ei malum pro bono! Filiam suam, quam nobis commisit nutriendam, crudelis leena devoravit. Heu cecatus sum! lugeam innocentem virginem! Vinctus sum ad pessimam venenosamque serpentem." Elevans oculos ad celum ait: "deus, tu scis, quia mundus sum a sanguine Tharsie, et requiras a Dyonisiade!" Respexit uxorem suam et ait: "quomodo suffocasti filiam regis, inimica dei hominumque obprobrium!" Illa vero induit se et filiam suam lugubres vestes, falsasque lacrimas fundunt et clamabant coram civibus: "cives carissimi, ideo ad vos clamamus, quia spes oculorum nostrorum, Tharsia, quam vidistis, subito dolore defuncta est et nobis cruciatus et amaros fletus reliquit. Quam digne sepelire fecimus." Tunc pergunt cives, ubi figuratum erat sepulchrum et pro meritis patris fabricabant loculum ex ere et scripserunt: "dii manes: cives Tharsie virgini pro beneficiis patris ejus sepulchrum ex ere collatum fecerunt." Igitur qui puellam rapuerant, venerunt ad civitatem Machilenam. Deponitur ergo illa inter cetera mancipia venalis. Audiens eam leno infaustissimus ac impurus ac dives contendere cepit, ut eam emeret. Sed Athanagora, princeps ejusdem civitatis, videns eam nobilem, sapientem pulchramque obtulit decem sestercias auri. Leno ait: "ego dabo XX." Athanagora dixit: "ego XXX." Leno: "ego XL." Athanagora: "L." Leno: "LX." Athanagora: "LXX." Leno: "LXXX." Athanagora: "XC." Leno: "in presenti C sestescias auri dabo." Et ait: "si quis amplius, X dabo supra." Athenagora ait: "ego, si cum lenone contendere voluero, ut unam emam, plures venditurus sum. Permittam eum emere, et cum prostituerit eam in lupanar, intrabo prius ad illam et eripiam nodum virginitatis ejus, et erit mihi sicut emerim eam." Quid plura? Perrexit cum lenone in salutatorium, ubi habuit Priapum aureum et gemmis adornatum et ait: "puella, adora istum!" Ait illa: "nunquam tale adorem!" Et ait: "domine, numquid Lapsacenus es tu?" Leno ait: "quare?" Et illa: "quia Lapsaceni colunt Priapum." Leno ait: "nescis, misera, quia in domum lenonis avari incurristi?" Puella prosternens se ad pedes ejus ait: "o miserere, domine, virginitati mee! Ne prostituas hoc corpus sub tali turpi titulo." Cui leno ait: "nescis, quia apud lenonem et tortorem nec preces nec lacrime valent?" Tamen vocavit villicum puellarum et ait: "hec puella ornetur vestibus puellaribus preciosis, et scribatur ei titulus: "quicunque Tharsiam violaverit, mediam libram dabit; postea ad singulos solidos patebit populo." Villicus fecit, quod jussum fuerat cum lenone. Tercia die antecedente turba cum symphonia deducitur ad lupanar. Sed Athanagora princeps civitatis primus ingreditur velato capite. Tharsia videns eum procidit ad pedes ejus et ait: "miserere mei, domine, propter deum! Et per deum te adjuro, ne velis me violare! Resiste libidini tue et audi casus infelicitatis mee et originem, unde sim, diligenter considera!" Cui cum universos casus suos exposuisset, princeps confusus et pietate plenus ait ei: "habeo et ego filiam tibi similem, de qua similes casus metuo." Hec dicens dedit ei XX aureos dicens: "ecce habes amplius quam virginitatis propositum est. Dic advenientibus, sicut mihi dixisti, et liberaberis!" Puella profusis lacrimis ait: "ego pietati tue gracias ago. Et ne alicui narres, que a me audisti!" Athanagora ait: "si narravero, filie mee, cum ad talem etatem penenerit, similem casum ne patiatur." Et cum lacrimis discessit. Cui exeunti obviavit ei alius et ait: "quomodo tibi convenit cum puella?" Ait princeps: "non potest melius: erat enim tristis." Intravit juvenis et puella more solito ostium claudit. Cui juvenis ait: "quantum dedit tibi princeps?" Ait puella: "quadriginta aureos." At ille: "accipe integram libram auri!" Princeps audivit, ait: "quanto plus dabis, tanto plus plorabit." Puella nummos accepit, procidit ad pedes ejus et casus suos indicavit. Aporiatus juvenis ait: "domina, surge! Homines sumus. Casibus subjacemes." Hiis dictis exiit. Vidit itaque Athanagoram ridentem et ait illi: "magnus homo es! non habes, cui lacrimas propines nisi mihi?" Et jurabant, ne hec verba cuiquam proderent, et ceperunt adventum aliorum expectare. Venerunt multi. Dantes pecuniam intrabant, flentes exibant. Postea obtulit pecuniam lenoni dicens: "ecce precium virgini tatis mee! Leno ait: "Vide, ut cotidie tantas pecunias afferas!" Altera die iterum ait ad eum: "ecce precium virginitatis mee, quam lacrimis et precibus custodio." Iratus leno audiens, quod virgo esset, vocat villicum puellarum et ait: "duc eam ad te et frange nodum virginitatis ejus!" Cumque eam villicus duxisset in cubiculum, dixit ad eam: "dic mihi, si virgo es." At illa: "quamdiu deus vult, virgo sum." At ille: "unde tantam tulist pecuniam?" Puella ait: "lacrimis profusis exponens casus meos rogavi homines, ut misericordiam virginitatis mee haberent." Et prosternens se pedibus eius ait: "miserere mei, domine, subveni captive regis filie! ne violes me!" At ille: "leno est avarus: nescio, si possis virgo permanere." At illa: "studiis liberalibus. Erudita sum et in genere musicali possum modulari. Duc me in forum! Ibi poteris facundiam meam audire: proponam questiones populo et proposita solvam et hac arte applicabo pecunias cotidie." At ille: "mihi bene placet." Omnis populus cucurrit ad virginem videndam. At illa aggreditur facundiam studiorum; questiones sibi proponi jubet, omnes clare solvit. Tunc clamor populi factus est magnus circa eam et multam pecuniam a populo recepit. Athanagora vero illam integra virginitate ut unicam filiam custodiebat, ita ut eam donis multis villico commendaret. Cum hec agerentur, venit Appollonius XIIII° anno jam transacto ad domum Stranguilionis et Dyonisiadis in civitatem Tharsum. Quem cum vidisset Stranguilio, perrexit rabido cursu dixitque uxori sue Dyonisiade: "dixisti Appollonium naufragium fecisse: ecce venit ad repetendam filiam suam! Quid dicturi sumus patri pro filia?" Et illa dixit: "miser vir et ego conjux! Accipiamus vestes lugubres et perfundamus lacrimas! Et credet nobis, quod filia ejus morte naturali defuncta est." Cum hec ita dicerent, intravit Appollonius. Ut vero vidit eos lugubri veste indutos, ait: "quare in adventu meo funditis lacrimas? Credo, quod iste lacrime non sunt vestre sed mee." Ait mulier nequam: "utinam ad aures tuas alius et non ego aut conjux meus diceret, quod jam dicam! Tharsia, filia tua, subito defuncta est." Appollonius hoc audiens, totum corpus ejus contremuit, diuque defixus stetit. Tandem resumpto spiritu intuens mulierem ait: "o mulier, si filia mea defuncta est, ut dicis, numquid et pecunia ac vestes simulque ornamenta perierunt?" Ait illa: "aliqua sunt, aliqua perierunt." Et dixerunt: "crede nobis, quia credidimus, ut filiam tuam viventem invenires. Et ut scias nos non esse mentitos, habemus testimonium: cives enim nostri memores beneficiorum tuorum in proximo litore ex ere collato filie tue monumentum fecerunt, quod potes videre." Appollonius credens eam esse defunctam ad famulos ait: "tollite hec, famuli, et ferte ad navem! Ego vadam] ad filie mee monumentum." Legit titulum sicut superius est scriptum.

Stetit quasi extra se maledicens oculos proprios et ait: "o crudeles oculi, potuistis titulum filie mee cernere, non potuistis lacrimas fundere!" Hiis dictis ad navem perrexit et ait famulis suis: "projicite me, quero, in profunditatem navis; cupio enim in undis exhalare spiritum." Et dum prosperis navigat ventis Tyrum reversurus, subito mutatum est pelagus, et per diversa maris discrimina naves jactabantur. Omnibus autem deum rogantibus ad Machilenam civitatem, in qua erat filia sua Tharsia, venerunt. Gubernator autem cum omnibus magnum plausum dedit. Ait Appollonius: "quis sonus hilaritatis aures meas percussit?" Ait gubernator: "gaude, domine, quia hodie Neptunalia celebrantur." Appollonius ingemuit et ait: "et omnes diem festum celebrent preter me!" Tunc vocavit dispensatorem suum et ait ei: "sufficiat famulis meis pena mea ac dolor—dona eis X aureos, et emant, si que voluerint, et diem festum celebrent. Et quicunque vocaverit me vel gaudium mihi fecerit, crura illorum frangi jubeo." Dispensator itaque emit necessaria et rediit ad navem. Cum igitur inter omnes naves navis Appollonii honoracior esset, cum magno convivio ceteris melius celebrant naute Appollonii. Athenagora, qui Tharsium diligebat, juxta navem in litore ambulabat viditque navem Appollonii et ait: "amici, ecce navis ista mihi placet, quam video decenter esse paratam." Naute, ut audiunt suam navem laudari, dixerunt ei: "o domine, rogamus, in navem nostram ascendatis." Et ille: "mihi placet." Ascendit et libenti animo discubuit posiutque decem aureos in mensa et ait: "ecce, ne frustra me invitaveritis!" Et dixerunt: "domine regraciamur vobis." Cum autem princeps vidisset omnes discumbentes, ait: "quis est dominus navis?" Ait gubernator: "dominus navis in luctu moratur, jacet inferius et opstinat: in mari conjugem perdidit et in terra filiam." Athanagora ait uni servo, Ardalio nomine: "dabo tibi duos aureos; tantum descende et dic ei: "rogat te princeps civitatis hujus: procede de tenebris ad lucem!" Ait juvenis: "non possum aureis tuis crura mea reparare. Quere alium, quia jussit, ut quicunque eum appellaverit, crura ejus frangantur." Athanagora ait: "hanc legem vobis constituit, non mihi; ego autem descendam ad eum. Dicito mihi, quis vocatur." At ille: "Appollonius." Audito hoc nomine ait intra se: "et Tharsia appellavit patrem suum Appollonium." Descendit ad eum. Quem ut vidit barba, capite squalidum, submissa voce dixit: "ave Appolloni!" Appollonius ut audivit, putans se ab aliquo servorum suorum appellari, turbulento vultu respiciens vidit ignotum hominem, honestum et decorum. Siluit. Ait princeps: "scio te mirari, quod ego ignotus te appellavi. Disce, quia princeps sum hujus civitatis, Athanagora nomine. Descendi ad litus ad naves contuendas, inter ceteras vidi navem tuam decenter ornatam et amavi aspectum eius. Invitatus eram a nautis tuis. Ascendi et libenti animo discubui. Inquisivi dominum navis. Quem dixerunt in luctu grandi esse; quod et video. Propter quod ad te descendi, ut de tenebris producerem te ad lucem. Spero autem, quia dabit tibi deus post luctum gaudium." Appollonius levavit caput et ait: "quisquis es, domine, vade in pace! Ego autem non sum dignus epulari et ideo amplius vivere nolo." Athanagora confusus ascendit in superiora navis et dixit: "non valeo persuadere domino vestro, ut ad lucem exeat. Quid faciam, ut revocem a proposito mortis?" Vocavit unum de pueris suis et ait: "vade ad lenonem et roga eum, ut mittat ad me Tharsiam. Habet enim sapienciam et sermonem suavem; potest eum forsitan exhortari, ne talis taliter moriatur." Venit igitur puella ad navem, ad quam ait Athanagora: "veni ad me Tharsia domina! Hic est necessaria ars studiorum tuorum, ut consoleris dominum navis in tenebris sedentem et ut provoces eum exire ad lucem, quia nimis dolet pro conjuge sua et filia. Accede ergo ad eum et suade, ut ad lucem veniat, quia forte deus per te luctum suum in gaudium convertet. Si enim hoc poteris facere, dabo tibi XXX sestercias auri et totidem argenti et XXX dies redimam te a lenone.' Puella hec audiens constanter ad eum descendit et humili voce salutavit eum dicens: "salve, quicunque es, salve et letare! Scias, quia innocens virgo, que virginitatem suam inter naufragia sua et castitatem inviolatam conservavit, te salutat." Tunc in carminibus cepit modulata voce cantare in magna dulcedine, intantum quod mirabatur Appollonius. Et dixit cantando ea que hic sequuntur:

"Per sortes gradior, sed sortum conscia non sum,
Sic spinis rosa non scit violari et ullis.
Corruit et raptor gladii ferientis ab ictu.
Tradita lenoni non sum violata pudore.
Vulnera cessassent animi, lacrimeque deessent,
Nulla etenim melior si nossem certa parentes.
Unica regalis generis sum stirpe creata.
Ipsa jubente deo letari credo aliquando.
Fuge modo lacrimas, curam dissolve molestam,
Redde polo faciem mentemque ad sidera tolle!
Jam deus est hominum plasmator, rector et auctor:
Non sinet has lacrimas casso finire labore!"

Ad hec Appollonius levavit oculos et, ut vidit puellam, engemuit et ait: "heu mihi misero! quamdiu luctabor? Gratias ago prudencie tue et nolilitati. Hanc vicem rependo, ut memor tui sim. Quando letari licet, regni mei viribus levabor: forsitan, ut dicis, regio genere orta est, natalibus parentum tuorum representaberis. Nunc accipe centum aureos et recede! Noli me appellare; recenti enim luctu renovata calamitate tabesco!"

Puella acceptis aureis abire cepit. Et ait ad eam Athanagora: "quo vadis, Tharsia? Sine effectu laborasti? Non potuisti facere misericordiam ac subvenire homini interficienti se?" Et ait Tharsia: "omnia, quecunque potui, feci, et datis mihi centum aureis abire rogavit." Athanagora ait:

" dabo tibi ducentos, descende et redde ei, quos dedit, et dic: "salutem tuam quero, non pecuniam." Descendens Tharsia sedit juxta eum et ait: "si in isto squalore manere destinasti, permitte me tecum sermocinari. Si ergo parabolarum mearum nodos absolveris, vadam; sin, alias, refundam tibi pecuniam et abscedam." Tunc Appollonius, ne reciperet pecuniam, sed eciam puelle prudentes ne negaret sermones, ait: "licet in malis meis nulla cura mihi suppetat nisi flendi et lugendi, tamen, ne ornamento prudencie tue caream, dic, quod interrogatura es, et abscede! Peto enim, ut fletibus meis spacium tribuas." Ait Tharsia: jam audito me:

Est domus in terris, que nobis clausa resultat.
Ipsa domus resonat, tacitus sed non sonat hospes.
Ambo tamen currunt, hospes simul et domus una.

Et ait: "si rex es, ut dicis, convenit te mihi esse prudenciorem: solve questionem!" Ait Appollonius: "ut scias me non esse mentitum: domus, que in terra resonat, unda est, hospes tacitus piscis est, qui cum domo sua currit." At illa:

Longa feror velox formose filia silve,
Innumera pariter comitum stipante caterva,
Curro vias multas, vestigia nulla relinquo.

Appollonius ait: "o si licitum esset, ostenderem tibi multa, que ignoras. Tamen respondebo questionibus tuis; miror te tam tenera etate mirifica prudencia esse imbutam. Namque arbor stipata catervis, vias multas currens et vestigia nulla relinquens, navis est." Et addidit puella:

Per totas edes innoxius pertransit ignis.
Est calor in medio magnus, quem nemo removit,
Non est nuda domus, nudus sed convenit hospes.
Si luctum poneres, innocens intrares in ignes.

Appollonius ait: "intrarem balneum, ubi hinc inde flamme per tabulas surgunt. Nuda domus, in qua nihil intus est, nudus hospes convenit, nudus sudabit." Cumque hec et similia dicerent, puella misit se super Appollonium et distractis manibus amplexebatur eum dicens ei: "exaudi vocem deprecantis, respice virginem, quia virum talis prudencie mori nefarium est. Si conjugem desideras: deus ex sua gracia tibi restituat; si filiam: salvam, quam defunctam dicis, invenire poteris. Pre gaudio oportet te vivere!" Appollonius, cum verba hec audisset, in iracundiam versus est, surrexit et puellam cum pede percussit. Impulsa vero virgo cecedit et gene eius rupte cepit sanguis effluere. Conturbata virgo cepit flere et dixit: "o deus, conditar celorum, vide afflictionem meam! Nata sum inter fluctus et procellas maris, mater mea doloribus constricta defuncta est, et sepultura est ei negata in terris. Ornata a patre meo et in loculo posita cum XX sisterciis auri mari tradita est. Ego infelix Stranguilioni et |Dyonisiadi, impiissimis hominibus, a patre meo sum tradita cum ornamentis et regalibus vestibus. Et per Dyonisiadem veni, quia jussa sum a servis eorum occidi. Tandem petivi, ut deum invocarem, antequam me occideret: mihi concessit. Piratis supervenientibus rapta sum (et qui occidere me volebat, fugam petiit) et in hunc locum deducta. Et deus, quando ei placet, reddet me Appollonio patri meo!" Appollonius audiens omnia hec signa certissima, exclamavit voce magna et ait: "o domine misericors, qui conspicis celum et abyssum et omnia secreta patefacis, benedictum sit nomen tuum!" Cum hec dixisset, cecidit super amplexus Tharsie, filie sue, et osculatus est eam et pre gaudio flevit amare et ait: "o dulcissima nata mea et unica, dimidium anime mee! Non moriar propter te; inveni propter quam volebam mori!" Alta voce clamabat dicens: "currite, famuli! currite, amici! currite omnes, et miserie mee finem imponite! Inveni quam perdideram, scilicet unicam filiam meam." Audito clamore famuli cucurrerunt, cucurrit inter illos Athanagora princeps. Et descendentibus illis in navim invenerunt eum flentem pre gaudio super collum filie sue et dicentem: "ecce filia mea, quam lugeo, dimidium anime mee. Jam volo vivere!" Omnes pre gaudio cum eo flebant. Tunc erigens se Appollonius, projectis vestibus lugubribus indutus est vestibus mundissimis. Et omnes dixerunt: "o domine, quam similis est vobis filia vestra! Si non esset aliud experimentum, sufficeret ejus similitudo ad probandum, eam esse filiam vestram." Tunc filia bis, ter, quater osculata est patrem et ait: "o pater, benedictus sit deus, qui mihi gratiam dedit, quod te videre potero, tecum vivere, tecum mori!" Et narravit ei, quomodo a lenone comparata et in lupanari est posita, et quomodo deus suam virginitatem custodivit. Audiens hec Athanagora, timens, ne alteri filiam in uxorem daret, misit se ad pedes Appollonii dicens: "adjuro te per deum vivum, qui te patrem filie restituit, ne alteri des filiam in conjugem nisi mihi. Sum enim princeps hujus civitatis, meo auxilio virgo permansit et me duce te patrem agnovit." Cui Appollonius ait: "non possum tibi esse contrarius, quia multa pro filia mea fecisti. Et ideo opto, ut sic uxor tua. Tunc restat, ut vindicem me a lenone, qui tot injurias fecit filie mee." His auditis Athanagora civitatem intravit convocatisque civibus dixit: "ne pereat civitas propter unum impium! Sciatis Appollonium regem, patrem Tharsie ad hoc venisse. Ecce classes navium properant cum grandi exercitu ad destruendam civitatem propter lenonem, qui filiam suam Tharsiam in lupanari constituit." Hiis dictis concursus magnus factus est et tanta commotio populi, ut nec viri nec femine remanerent, quin currerent omnes ad Appollonium regem videndo eum et misericordiam petendo. Ait Athanagora: "consulo ad hoc, ut, ne destruatur civitas, deducatur ad eum leno." Captus est statim leno et ligatis manibus a tergo deducitur ad regem. Appollonius, regia veste indutus, tonso capite, diadema imposuit capiti suo, tribunal ascendit cum filia et civibus dixit: "videtis Tharsiam virginem a patre suo hodie cognitam, quam cupidissimus leno, quantum erat in eo, ... ejus corruptionem et confusionem perpetuam procurabat nec a malicia sua prece nec precio desistere volebat. Facite ergo filie mee vindictam !" Omnes una voce dixerunt: "domine, leno vivus comburatur, et divicie eius puelle dentur." Protinus adducitur leno et coram omnibus in igne ponitur et totaliter comburitur. Tharsia ait villico: "dono tibi libertatem, quia beneficio tuo et civium virgo permansi." Et donavit ei ducentos aureos et libertatem. Libertatem vero cunctis puellis coram se presentatis perdonavit et dixit: "quidcunque de corpore vestro actenus . . . . servistis, ex hoc libere estote." Appollonius loquitur ad populum dicens: "gratias vobis reddo de beneficiis vestris mihi et filie mee factis. Nunc ergo tribuo vobis auri pondera quinquaginta." Illi ei capita sua inclinabant gracias referentes. Cives vero statuam Appollonii in medio civitatis fecerunt et in basi scripserunt. "Tyrio Appollonio, restauratori domuum nostrarum, et Tharsie, sanctissime filie ejus, virgini." Intra paucos dies Appollonius tradidit filiam suam in conjugem Athanagore cum ingenti leticia totius civitatis. Et cum genero et filia navigans, cum omnibus suis volens per Tharsum profiscendo in patriam suam ire, in sompnis admonitus est per angelum, ut Ephesum descenderet et intraret templum Ephesiorum cum filia et genero suo ibique omnes casus suos alta voce exponeret, quos passus esset a juventute sua. Postea veniret Tharsum et vindicaret filiam suam. Appollonius expergefactus omnia indicavit genero et filie sue. Et illi dixerunt: "fac, domine, quod tibi videtur." Tunc jussit gubernatori navigare Ephesum. Qui cum descendisset ratim, cum suis templum petiit, ubi conjux sua inter sacerdotes sancte vixit. Rogavit, ut templum ei aperiretur. Quod et factum est. Hec audiens uxor eius, quod quidam rex venerat cum filia et genero, gemmis regalibus ornavit caput suum et induit se vesta purpurea et cum honesto comitatu templum intravit. Erat enim nimis pulchra et ob nimium castitatis amorem asserebant omnes nullam tam gratam esse virginem. Quam videns Appollonius in nullo noticiam eius habebat. Misit se ad pedes eius cum filia sua et genero; tantus enim splendor eius pulchritudinis imminebat, ut ipsa Diana esse videntibus putaretur. Statim in templo optulit munera preciosa. Et post hec cepit Appollonius dicere, sicut ei angelus in sompnis dixerat: "ego ab adolescencia rex, natus Tyrus, Appollonius nominatus, cum ad omnem scientiam pervenissem, regis iniqui Antiochi questionem exsolvi, ut eius filiam acciperem. Ille vero eam defloraverat ac in impietate sua continue tenuit: et me occidere conabatur. Fugam petii et in mari omnia perdidi. Et post hec a rege Altistrate gratissime susceptus intantum eius benevolentiam sum expertus, ut filiam suam mihi in uxorem daret. Deinde mortuo Antiocho cum properarem ad regnum percipiendum, uxorem meam mecum duxi. Hanc filiam in mari peperit uxor mea, de cujus partu defuncta est. Quam ego cum XX sisterciis auri in loculo clausam in mare misi, ut inventa digne sepeliretur. Et hanc filiam meam nutriendam nequissimus hominibus commendavi et superiores

Egipti partes pecii. Quarto autem decimo anno adveniens, ut filiam meam expeterem, dixerunt eam esse defunctam. Et dum credidi, in luctu vixi et in lugubribus vestibus, et mori cupiens mihi filia mea reddita est." Cum hec et hiis similia narraret, Altistratis regis filia, uxor ipsius, levavit se et rapuit eum in amplexus volensque eum osculari. Appollonius autem repulit eam a se cum indignacione, ignorans, quod uxor sua esset. At illa cum lacrimis dicebat: "o domine mi, dimidium anime mee, cur sic agis? Ego sum conjux tua, Altistratis regis filia, et tu es Tyrius Appollonius, maritus et dominus meus, tu es magister meus, qui me docuisti, tu es naufragus, quem amavi non causa libidinis sed sapiencie." Appollonius hec audiens statim eius noticiam habebat, cecidit super collum eius et pre gaudio lacrimas emisit dicens: "benedictus sit Altissimus, qui mihi uxorem cum filia reddidit!" At illa: "ubi est filia mea?" Et ipse ostendens Tharsiam dixit: "hec est filia nostra, quam vides." Illa vero osculata est eam. Fit leticia magna in tota civitate et in circuitu: quod rex Appollonius uxorem suam in templo invenit, famatum est. Appollonius ascendit navim cum uxore et filia et genero, revertentes ad patriam suam. Veniens igitur Appollonius Antiochiam regnum sibi reservatum recepit et pergens Tyrum constituit in locum suum Anthanagoram generum suum. Deinde cum ipso genero et filia sua et cum exercitu regio venio Tharsum jussit comprehendere Dyonisiadem et Stranguilionem et duci ante se et coram omnibus civibus ait: "cives Tharsenses, numquid ego alicui vestrum exstiti ingratus?" Omnes dixerunt: "non, domine! Parati sumus pro vobis mori. Hec statua est facta in signum, quia nos a morte salvastis." Appollonius ait: "commendavi filiam meam Stranguilioni et Dyonisiadi uxori sue, et eam mihi reddere noluerunt." Infelix mulier ait: "bone domine, numquid non tu ipse titulum monumenti eius legisti?" Appollonius jussit venire filiam suam Tharsiam in presencia omnium. Et Tharsia maledixit mulieri et dixit: "ave, salutat te Tharsia ab inferis revocata!" Infelix mulier videns eam toto corpore contremuit. Cives mirabantur et gaudebant. Et jussit Tharsia venire villicum, cui dixit: "Theophile, ut possit tibi ignosci, clara voce responde: quis me interficiendam tibi obligavit?" Tunc cives rapuerunt Stranguilionem et Dyonisiadem et extra civitatem trahentes lapidaverunt, volentes et Theophilum occidere. Sed Tharsia eum a morte liberavit. Et dixit: "nisi mihi spacium ad orandum dedisset, modo eum non defenderem." Appollonius dedit munera ad restaurandam civitatem. Et moratus est ibi tribus mensibus. Navigans inde Pentapolim civitatem curiam ingreditur ad Altistratem regem. Gaudens rex vero senex factus est, vidit filiam suam et neptem cum marito suo, rege. Per integrum annum letanter insimul permanserunt. Post hec moritur perfecta etate in manibus eorum, dimittens dimidietatem regni sui Appollonio et medietatem filie sue. Omnibus hiis peractis dum ambularet Appollonius juxta mare, vidit piscatorem, qui eum post naufragium recepit. Jussitque eum apprehendere et ad palatium duci.

Videns piscator a militibus se comprehendi putavit occidi. Ingressus Appollonius jussit eum adduci ad se et ait: "hic est paranymphus meus, qui mihi post naufragium opem dedit et ad civitatem venire ostendit." Et dicit ei: "ego sum Tyrius Appollonius." Et jussit sibi dari CC sistercias argenti, servos et ancillas, et fecit eum comitem suum, quamdiu vixit. Elamitus vero, qui ei de Antiocho nunciavit, procidens ad pedes Appollonii . . . . et ait: "domine, memor esto Elamiti servi tui!" Appollonius apprehensa manu eius erexit eum fecitque eum divitem et ordinavit comitem. Hiis expletis genuit Appollonius filium de conjuge sua, quem in loco avi sui Altistratis constituit regem. Vixit vero Appollonius cum conjuge sua annos LXXIV et tenuit regnum Antioche et Tyri et Tyrenensium quiete ac feliciter. Casus suos ipse descripsit, ipse duo volumina perfecit, unum in templo Ephesiorum, alterum in sua bibliotheca collocavit. Et defunctus est et perrexit ad vitam eternam, ad quam vitam nos perducat, qui sine fine vivit et regnat Amen.

ON THE QUATERNION GROUP.

BY G. A. MILLER, PH.D.

(Read October 7, 1898.)

Although the quaternion group (Q) has received some attention,[1] yet many of the properties of this important group remain to be investigated. It is the object of this paper to enter upon the study of some of these group properties after stating the known principles which underlie the investigations that follow. We shall also determine the different ways in which Q may be represented as a substitution group.

It is well known that every group of a finite order may be represented as a regular substitution group and that any two regular substitution groups which are simply isomorphic are also conjugate.

A complete list of the regular substitution groups of order g must therefore include every possible group of this order and no group can occur twice in such a list. In following Prof. Cayley's notation we represent Q as a regular substitution group in the following manner: [1]

---

[1] Dedekind, *Mathematische Annalen*, 1897, Vol. xlviii, pp. 549–552.

1	*ae. bf. cg. dh*	*aceg. bdfh*
		agec. bhfd
		abef. chgd
		afeb. cdgh
		adeh. bgfc
		ahed. bcfg

THE DIFFERENT WAYS IN WHICH Q MAY BE REPRESENTED AS A SUBSTITUTION GROUP.

We observe, in the first place, that Q cannot be represented as a non-regular transitive substitution group. If such a representation were possible Q would have to contain some subgroup of a prime order that is not self-conjugate.[2] As it contains only one subgroup of order 2 this must clearly be self-conjugate. Hence we observe that *there is only one transitive substitution group that is simply isomorphic to Q.*

It is known that the number of the intransitive substitution groups that are simply isomorphic to a given group is an increasing function of the degree, which becomes infinite when the degree becomes infinite. We proceed to determine the nature of this function in the present case. Since every group whose order is the square of a prime number is Abelian, a substitution group which is simply isomorphic to Q must contain at least one transitive constituent of order 8 and its degree must be $2n$, n being a positive integer greater than 3.

We have seen that Q contains only one subgroup of order 2. With respect to this it is isomorphic to the four-group, since this subgroup contains the square of each one of its operators. As a subgroup whose order is one-half of the order of the entire group must always be self-conjugate, Q contains three self-conjugate subgroups of order 4. Since none of these three subgroups is characteristic[3] they must be transformed into each other by the largest group that contains Q as a self-conjugate subgroup. Hence we need to consider only one of these three subgroups in connection with the study of the intransitive substitution groups that are simply isomorphic to Q.

---

[1] Cayley, *Quarterly Journal of Mathematics*, 1891, Vol. xxv, p. 144.

[2] Cf. Dyck, *Mathematische Annalen*, 1883, Vol. xxii, p. 90. It may be remarked that the statement on p. 101 of this article that a group which can be represented only in the regular form contains only self-conjugate subgroups is not quite correct, as may also be inferred from other parts of the same article.

[3] Frobenius, *Berliner Sitzungsberichte*, 1895, p. 183.

We may now state the problem of finding all the substitution groups that are simply isomorphic to Q in the following manner. Such a group contains a transitive constituents of order 8, where a is an integer greater than 0. Its other constituents form a group whose order is either 4 or 2. If this order is four these constituents must form the four-group. If it is two these can form only one group for a given set of values of n and a. Hence we observe that the number of quaternion substitution groups of degree $2n$, $n > 3$, which contain no constituent group of order 4 is a_2, where a_2 is the largest integral value of x that satisfies the relation:

$$x \leqq \frac{n}{4}.$$

To find the number of these groups that contain a constituent of order 4 we may first find the number of those that contain only one transitive constituent of order 8, then the number of those that contain two such constituents, etc. The sum of these numbers is the number required. Each of these numbers may be directly found by means of the following formula,[1] in which N is the number of all the possible substitution groups of order 4 and degree $2n$, m is any positive integer, and a_1 is the largest value of y that satisfies the relation

$$y \leqq \frac{n}{2}$$

When $n = 6m$, $N = m(3m^2 + 6m + 1) + a_1$

" $n = 6m + 1$, $N = \frac{m(6m^2 + 15m + 5)}{2} + a_1$

" $n = 6m + 2$, $N = 3m(m + 1)(m + 2) + 1 + a_1$

" $n = 6m + 3$, $N = \frac{(2m + 1)(3m^2 + 9m + 4)}{2} + a_1$

" $n = 6m + 4$, $N = (m + 1)(3m^2 + 9m + 4) + a_1$

" $n = 6m + 5$, $N = \frac{3(m + 1)(2m^2 + 7m + 4)}{2} + a_1$

---

[1] Miller, *Philosophical Magazine*, 1896, Vol. xli, p. 437.

If we add a_2 to the sum of the numbers obtained by means of these formulas we obtain the total number of the substitution groups of degree $2n$ that are simply isomorphic to Q. Among these substitution groups the given regular group is especially convenient for the study of the properties of Q.

In what follows we shall, therefore, suppose Q written in this way unless the contrary is explicitly stated.

It is known that all the substitutions that involve no more than g letters and are commutative to every substitution of a regular group involving the same g letters form a group which is conjugate to the regular group.[1] This conjugate of the given regular group contains the following substitutions:

1 *ae. bf. cg. dh* *aceg. bhfd*
agec. bdfh
abef. cdgh
afeb. chgd
adeh. bcfg
ahed. bgfc

One of the 192 substitutions in these 8 letters that transform one of these two regular groups into the other is the transposition *dh*.

THE GROUP OF ISOMORPHISMS OF Q.

The largest group in these eight letters that transforms one of the two given regular groups into itself must be transitive, since it includes a regular group. Its subgroup which includes all its substitutions that do not involve a given letter is the group of isomorphisms of Q. We proceed to prove that this is simply isomorphic to the symmetric group of order 24. To prove this we observe that an operator of order 4 may be made to correspond to any other operator of this order in a simple isomorphism of Q to itself. Hence the first correspondence can be effected in 6 ways and the second can evidently be effected in 4 ways, so that the group of isomorphisms must be of order 24.

This group of isomorphisms may be represented as a transitive substitution group of degree 6, since there are 6 operators of order

---

[1] Jordan, *Traité des Substitutions*, p. 60.

4 that can be made to correspond and these generate Q. As this substitution group cannot contain a substitution whose degree is less than 4 and the transitive groups of degree 6 and order 24 that have this property are simply isomorphic to the symmetric group of this order it follows directly that *the group of isomorphisms of Q is the symmetric group of order* 24 *and that the group of cogredient isomorphisms is its self-conjugate subgroup of order* 4.

There are two transitive groups of degree 6 that are simply isomorphic to the symmetric group of order 24. In one of these the subgroup which contains all the substitutions that do not include a given element is the cyclical group of order 4 while in the other it is the four-group. It remains to determine which of these two groups is the substitution group of isomorphisms of Q. This may be easily done by making Q simply isomorphic to itself in the following manner:

1	1	*abef. chgd*	*adeh. bgfc*
ae. bf. cg. dh	*ae. bf. cg. dh*	*afeb. cdgh*	*ahed. bcfg*
aceg. bdfh	*aceg. bdfh*	*adeh. bgfc*	*afeb. cdgh*
agec. bhfd	*agec. bhfd*	*ahed. bcfg*	*abef. chgd*

The substitution which corresponds to this isomorphism is given by the second columns of letters; hence it is bdfh and the substitution group of isomorphisms of Q is the one which Prof. Cayley represents by $(\pm \text{abcdef})_{24}$.[1]

It is known that Q is simply isomorphic to the eight unities (1, —1, i, —i, j, —j, k, —k) of the *quaternion number system.* As Q can be made simply isomorphic to itself in 24 different ways the simple isomorphism of Q to these unities or of these unities to themselves may also be written in 24 ways. The following is one of these ways:

1	1	*abef. chgd*	*j*
ae. bf. cg. dh	—1	*afeb. cdgh*	—*j*
aceg. bdfh	*i*	*adeh. bgfc*	—*k*
agec. bhfd	—*i*	*ahed. bcfg*	*k*

It may be very easily verified that the following relations are satisfied by the substitutions which correspond to the unities that are employed.[1]

---

[1] *Quarterly Journal of Mathematics*, 1891, Vol. xxv, p. 80.

$$\begin{array}{lll} ij = k & ji = -k & i^2 = -1 \\ jk = i & kj = -i & j^2 = -1 \\ ki = j & ik = -j & k^2 = -1 \end{array}$$

These relations between the quaternion unities could also have been obtained directly by means of the corresponding substitutions.

As any relation between quaternion unities remains true if we replace all these unities by those which correspond to them in any simple isomorphism of their group to itself, it follows directly that a knowledge of the group of isomorphisms of this group to itself is of great utility in transforming quaternion relations; *e. g.*, from the simple isomorphism

$$\begin{array}{r|l} 1 & 1 \\ -1 & -1 \\ i & j \\ -i & -j \end{array} \qquad \begin{array}{r|l} j & k \\ -j & -k \\ -k & -i \\ k & i \end{array}$$

it follows that i may be replaced by j, j by k, and k by i at the same time. In other words, we may always perform the substitution $ijk.\,(-i)\,(-j)\,(-k)$ on the three imaginary unities of quaternions. By means of this substitution we can obtain each of the three relations given above from any one of the set. The twenty-four possible substitutions in these imaginary unities can be directly obtained from the given group of isomorphisms of Q. They are the following:

$).\,j\,(-j)$
$).\,k\,(-k)$
$).\,k\,(-k)$

$ijk.\,(-i)\,(-j)\,(-k)$
$i\,(-j)\,(-k).\,jk\,(-i)$
$ij\,(-k).\,k\,(-i)\,(-j)$
$i\,(-j)\,k.\,j\,(-k)\,(-i)$
$ikj.\,(-i)\,(-k)\,(-j)$
$ik\,(-j).\,j\,(-i)\,(-k)$
$i\,(-k)\,(-j).\,j\,(-i)\,k$
$i\,(-k)\,j.\,k\,(-j)\,(-i)$

$j\,(-k)\,(-j)\,k$
$jk\,(-j)\,(-k)$
$ik\,(-i)\,(-k)$
$i\,(-k)\,(-i)\,k$
$i\,(-j)\,(-i)\,j$
$ij\,(-i)\,(-j)$

$ij.\,(-i)\,(-j).\,k\,(-k)$
$i\,(-i).\,jk.\,(-j)\,(-k)$
$i\,(-i).\,j\,(-k).\,(-j)\,k$
$i\,(-j).\,j\,(-i).\,k\,(-k)$
$ik.\,j\,(-j).\,(-i)\,(-k)$
$i\,(-k).\,j\,(-j).\,k\,(-i)$

when an equation between the quaternion unities admits a of these substitutions these substitutions must form a subgroup of this group of isomorphism and the given equation must assume $24 \div a$ different forms which are equally true in case it is transformed by all these substitutions, *e. g.*, each of the three equations in the last set given above admits a cyclical subgroup of order 4. Hence each of these equations gives rise to $24 \div 4 = 6$ true equations. In addition to the three that have been given we have $(-i)^2 = (-j)^2 = (-k)^2 = -1$.

---

[1] Cf. Tait's *Quaternion*, 1890, p. 46.

We have already noticed that the group of cogredient isomorphisms of Q is the four-group. Hence Q has only two operators that are commutative to each one of its operators. These are evidently the operators which correspond to 1 and — 1 in the quaternion unities. These two unities are therefore the only ones in the quarternion number system that are commutative to all the numbers of the system. It need scarcely be remarked that any one of the three cyclical subgroups of order 4 contained in Q may correspond to the unities of the ordinary complex number system.

RELATION BETWEEN THE QUATERNION GROUP AND THE HAMILTONIAN GROUPS.

One of the most remarkable properties of the quaternion group is that each of its subgroups is self-conjugate. Dedekind has called all the groups which have this property *Hamiltonian groups* and he has pointed out that the quaternion group is of fundamental importance in the study of the Hamiltonian groups.[1] It has recently been proved that every Hamiltonian group is the direct product of an Abelian group of an odd order and a Hamiltonian group of order 2^a, and that there is one and only one Hamiltonian group of order 2^a for every integer value of a greater than 2.[2]

It is easy to see that the direct product of the quaternion group and the Abelian group of order 2^{a-3} which contains $2^{a-3} - 1$ operators of order 2 is Hamiltonian. Since there is only one Hamiltonian group of this order it follows that every such Hamiltonian group may be constructed in this manner. Hence we have that *every Hamiltonian group whose order is divisible by* 2^a, *but not* 2^{a+1} *must be the direct product of some Abelian group of an odd order, the Abelian group of order* 2^{a-3} *which contains* $2^{a-3} - 1$ *operators of order* 2, *and the quaternion group.*

---

[1] Dedekind, *loc. cit.*

[2] Miller, *Comptes Rendus*, 1898, Vol. cxxvi, p. 1406.

While the direct product of the quaternion group and any Abelian group of an odd order is always a Hamiltonian group, the direct product of the quaternion group and an Abelian group whose order is divisible by a power of 2 is only Hamiltonian when the latter group contains no operator whose order is divisible 4. This follows directly from the fact that the group generated by the product of an operator of order 4 in the Hamiltonian group and any operator in such an Abelian group must be self-conjugate.

We may determine the number of the quaternion groups that are contained in a Hamiltonian group whose order is divisible by 2^{α} without being divisible by $2^{\alpha+1}$ in the following manner. Such a group contains a single subgroup[1] of order 2^{α}. This subgroup includes 3 times $2^{\alpha-2}$ operators of order 4. Each quaternion subgroup includes two of the operators of order 4 that are included in a subgroup of order $2^{\alpha-1}$ which involves only $2^{\alpha-2}$ operators of order 4. Hence *there are* $2^{2\alpha\ \ 6}$ *quaternion subgroups in the given Hamiltonian group*. All of these have the commutator subgroup of the entire group in common. In other words, the commutator subgroup of a Hamiltonian group is the same as that of any one of its quaternion subgroups.

CORNELL UNIVERSITY, June, 1898.

Stated Meeting, October 21, 1898.

Vice-President SELLERS in the Chair.

Present, 12 members.

Prof. Lighter Witmer, a newly elected member, was presented to the Chair, and took his seat.

The minutes of the last stated meeting were read and approved.

Dr. Frazer read a letter from the International Geological Congress in regard to the establishment of an international floating institute, and offered the following resolution:

Resolved, That the President of the Society be requested to memorialize Congress in favor of an appropriation in aid of the investigations proposed at the meeting of the International Geological Congress held at St. Petersburg, Russia, in August, 1897, and that the President be requested to communicate to the Secretary of State what had been done at the St. Petersburg Congress in respect of establishing an international floating institute for the purposes named in the action of that Congress, and to request the Secretary of State to bring the subject to the attention of the proper committees of Congress.

---

[1] Sylow, *Mathematische Annalen*, 1872, Vol. v, p. 584.

which resolution, on his motion, was referred to the Officers and Council.

The Librarian presented a list of the donations to the Library, and called special attention to a valuable gift from Mr. Henry Pettit, of five volumes of contemporaneous clippings, illustrating the day-to-day history of the Hispano-American War; and of two volumes of *L'Illustration*, July, 1870–July, 1871, being the numbers issued in Paris during the Commune.

Mr. Pettit, by invitation, made some interesting remarks in connection with this donation.

Announcement was made of the decease of Prof. Gabriel de Mortillet, of St. Germain-en-Laye, France, who was elected to membership on February 15, 1895.

Prof. Albert H. Smyth read a paper on "Thomas Moore in Philadelphia," which was discussed by Messrs. Dickson and Wood.

A paper by Dr. Daniel G. Brinton was presented on "Two Unclassified Recent Vocabularies from South America."

Pending nominations for membership Nos. 1432, 1464, 1469, 1470, 1471, 1472, and new nominations Nos. 1473 and 1474 were read.

The rough minutes were read, and the Society was adjourned by the presiding officer.

ON TWO UNCLASSIFIED RECENT VOCABULARIES FROM SOUTH AMERICA.

BY DANIEL G. BRINTON, M.D.

(Read October 21, 1898.)

The time has almost passed when any South American Indian can speak in an unknown tongue. The hundreds and even thousands of "radically distinct" languages which the early travelers and missionaries supposed to exist on that continent have been reduced to about sixty linguistic stocks, with a fair prospect of further diminution when materials for analysis become available.

To aid in this work it is important that each vocabulary collected by travelers be scrutinized and referred to its appropriate stock, if known, and, if not, that it be noted for further consideration. In pursuance of this, I shall briefly examine two vocabularies from South America which have been published within the last year, but which have not been referred by the writers who obtained them to any of the leading stocks.

The first is furnished by Mr. A. Rimbach, in his "Reise im Gebiet des oberen Amazonas," printed in the *Zeitschrift der Gesellschaft für Erdkunde*, Berlin, 1897, p. 379. He calls it the "Gay" language, and adds that he obtained it from some Andoas Indians whom he encountered on the lower reaches of the river Pastaza. He gives only five words, which are as follows:

Sun,	*mpanán.*
Eye,	*genamie.*
House,	*ité.*
Water,	*muaká.*
Path,	*núguako.*

This vocabulary belongs to what I have called in my work, *The American Race*, to the "Zaparo" linguistic stock, as is easily seen by comparing it with the Zaparo vocabulary collected by the Italian traveler, Osculati.[1]

Although by some writers the Andoas have been said to speak Quichua, this has been refuted by Tyler and others.[2] The name

---

[1] *Esplorazione delle Regioni Equatoriali*, App. (Milan, 1850).

[2] Cf. Tyler, in *The Geographical Journal*, June, 1894.

"Gay" or "Gae," applied to their tongue, is a Quichua word, and appears to be an abbreviation of *simi-kayay*, "mouth callers," another tribal name given them by the Quichuas, apparently from some peculiarity of their intonation.

An ancient authority of 1661 informs us that a group of tribes, including the Gayes, Avixiras, Coronados, Guasagas and Allpayos, "otherwise called Andoas and Toqueoreos," dwelt on the adjacent branches of the rivers Bobonaza, Tigre and Pastaza, all speaking the same language.[1] About a century later, another report speaks of the Andoas, Gaes and Semigaes as using the same tongue and dwelling together, "one hour's journey from the west bank of the river Pastaza."[2] These facts indicate how little was their change of location in two and a half centuries.

The second vocabulary is given in the *Geographical Journal*, July, 1898, in an interesting article written by Col. George Earl Church, on information supplied him by Dr. José Bach, of La Plata. The latter describes a remarkable method of subterranean telegraphy in use among the tribe whom he calls the "Catuquinarú," who occupy the lands between the rivers Embyra and Embyrasú, branches of the Tarauaca, which itself flows into the Jurua. They fill a cavity in the earth with broken bones, ashes and other solid substances, and by striking this with a club can convey the sound for about a mile to the next village.

Dr. Bach gives a short vocabulary of their tongue, and says that it "is very similar to the Miranhas of Amazonas and has a few words of the Therena of western Matto Grosso." He adds that they have usually been called the "Catuquinas." This is a Tupi word which Martius translates "good doors," and explains as meaning, either that the tribe lived in well-built houses, or else that they were hospitably inclined. He regards it as a compound of *catu*, good, and *ñay*, door.[3] But it seems to me more likely to be a compound of *catu*, good, and *quinaý*, female companion; and to refer to the sociability of the softer sex.

They certainly do not belong to the Tupi stock, as D'Orbigny thought,[4] nor are they related to the Tecuna stock, as Von Martius inclined to believe;[5] but those at least whom Dr. Bach visited are unquestionably a branch of the great Arawack family and are related, as he suggests, to the Terenos and Miranhas.

---

[1] See *Boletin de la Soc. Geog. de Madrid*, T. xxix, pp. 246, 261, 262.

[2] F. X. Veigl, *Nachrichten über Maynas*, p. 47 (Nürnberg, 1798.)

[3] *Beiträge zur Ethnographie Süd Amerikas*, Bd. i, p. 424.

[4] *L'Homme Americain*, Tome ii, p. 355.

[5] Martius, *u. s.*, p. 446.

This position has already been assigned to certain "Cataquinas" by Ehrenreich;[1] and the relationship is evident enough from Dr. Bach's vocabulary. But another problem faces us in explaining the wide discrepancy which his list of words shows when compared to the Catoquina vocabulary printed by von Martius.[2] The latter, taken by von Spix on the river Jurua, is certainly not of the same tribe, and it might appear doubtful if it belongs to the same stock, so wide are its discrepancies. But an extended comparison lines it up more closely with the Arawack than elsewhere.

I subjoin a comparison:

	CATOQUINA OF BACH.	CATOQUINA OF SPIX.	ARAWACK DIALECTS.
Arm,	*yano,*	*pang,*	*ghano.*
Arrow,	*uhynasú.*		
Bow,	*uhÿnarasúcó.*		
Breast,	*putia,*	*tshamâna-ghyta,*	*ochomi.*
Eyes,	*cesá,*	*yghó,*	*kiça, iki-se.*
Eyebrows,	*namÿ,*	*ghoatâ,*	*ichama.*
Feet,	*pihú,*	*achman.*	
Hair,	*anahé,*	*ghytai,*	*itschy, iti.*
Hammock,	*ouÿsauarusú.*		
Hands,	*punÿ,*	*paghy,*	*ako, p-aco.*
Head,	*tacasu,*	*ghy,*	*ita, vida, iquito.*
House,	*ocausú.*		
Legs,	*getemaupú,*		*buru, poro.*
Mouth,	*agaho,*	*nunaghy,*	*jaca.*
Neck,	*yayorua,*	*ghyúan.*	
Nose,	*tinoa,*	*opaghpó,*	*ti.*
Teeth,	*canhá,*	*ý,*	*hai, hi, ý.*
Water,	*uhehÿ,*	*uata-hy,*	*uhii.*

It is interesting to note that all the words in Bach's vocabulary which are not Arawack are pure Tupi. The word for "bow" is derived from that for "arrow," *uhyna*, which is the Tupi *hui*, or *uhi*; foot, *pihu*, is the Tupi *pi*; hammock, *ouysa*, is the Tupi *quiha*; and house, *oca*, is the same in Tupi. Except one, these are all "culture words," and indicate that the Catoquinas first became acquainted with the objects to which they refer after they had met the Tupi tribes.

---

[1] In Petermann's *Mittheilungen*, 1891, p. 17.

[2] Published in his *Wörtersammlung brasilianischer Sprachen* (Leipzig, 1867).

Stated Meeting, November 4, 1898.

Vice-President SELLERS in the Chair.

Present, 14 members.

The minutes of the last stated meeting were read and approved.

Letters were read from Dr. Rudolph Buti, of Baltimore, Md., inquiring if the Society would publish a translation of a fragment of the Book of the Dead; also another letter accompanying the manuscript.

On motion of Dr. Frazer, the paper of Dr. Buti was referred to a committee of three to be appointed by the President. The President subsequently appointed Prof. H. V. Hilprecht, Mr. Talcott Williams and Mrs. Cornelius Stevenson.

From Prof. H. V. Hilprecht, accepting the appointment as delegate to the Twelfth International Congress of Orientalists.

From the Academy of Sciences, Letters and Art of Modena, announcing the death of its President, Prof. Comm. Pietro Riccardi, on September 30, 1898.

From Dr. Frederick Prime, resigning his membership of the Committee on the Library.

On motion of Dr. Frazer, Dr. Prime's resignation was accepted, and the President was requested to appoint a member to fill the vacancy during the remainder of the unexpired term. Mr. J. G. Rosengarten was subsequently appointed.

Donations to the Library were announced by the Librarian.

Dr. Frazer presented to the Library and Cabinet a photograph of the reading of the annexation resolution of Congress to President Dole on the steps of the Royal Palace in Honolulu. Also a copy of the *Honolulu Commercial Advertiser*, and a statistical statement to date regarding the Islands of Hawaii, by the Commissionaire and Consul of France, formerly Consul of France in Philadelphia, M. Louis Vossion.

Senator Edmunds, on behalf of the Special Committee appointed for the consideration of the Magellanic Fund, presented a report, and offered the following resolutions, which were adopted:

Resolved, 1. That Mr. Samuel Dickson be and he is hereby authorized and requested to commence and prosecute in the proper court proceedings in the name of the Society to the end of obtaining a decree which will authorize this Society to offer premiums not exceeding $1000 to be paid out of income for approved papers which may be submitted to the Society under the provisions of the foundation of John Hyacinth de Magellan established in the year 1785, and that the President of the Society be and he hereby is authorized and requested to sign and verify the papers necessary to that end.

Resolved, 2. That the Treasurer be and he is hereby directed, under the advice of the Finance Committee, to invest the accumulated savings by the Magellanic Fund, as will, with the present investment of that fund, produce a clear income of $50 per year; and that the whole of such income shall be kept and specially invested to meet payments of premiums in respect of the Magellanic foundation.

Dr. Frazer exhibited specimens of flowers and scoriaceous lava from the "Punch Bowl," a short distance from the city of Honolulu, and sketched some of the geological features of the Hawaiian group.

Dr. Frazer also exhibited a reproduction, in cast iron made in sand scraped from the rafters of Mr. Garretson's foundry in Buffalo, of a bronze medal and pin, and compared it with the cast-iron medal presented to some of the members of the Seventh International Geological Congress by the proprietors of the Kytchtym Iron Works in the Urals.

Propositions for membership Nos. 1432, 1464, 1469, 1470, 1471, 1472 and 1474 were read.

Mr. Ingham, on behalf of the Committee on the Hall, presented a report, together with the two following resolutions, which were unanimously adopted:

Resolved, That the Hall Committee are authorized at their discretion to sell for the best price attainable the houses bequeathed to the Society by the will of the late Henry Phillips, Jr., and to invest the proceeds and to apply the revenue thereof for the purchase of books on Archeology and Philology for the library in accordance with the provisions of said will.

Resolved, That the Treasurer, Dr. Jayne, be and he is hereby authorized to execute conveyances in the name of the Society for the houses, singly or otherwise, the bequest of Henry Phillips, Jr., sold by order of the Society.

On behalf of the Committee appointed by the Society to revise the Rules of Administration and Order, Mr. Dickson presented the following report, and submitted printed copies of the proposed new rules:

PHILADELPHIA, November 4, 1898.

The Committee appointed at the meeting of May 13, 1898, to revise the rules of administration and order respectfully reports:

That it has considered the existing rules in relation to the laws as now established, and respectfully submits the accompanying draft for the consideration of the Society.

[Signed] SAMUEL DICKSON,
W. A. INGHAM,
HENRY PETTIT,
HORACE JAYNE,
I. MINIS HAYS.

Mr. Dickson gave notice that he would call up the rules at the next meeting of the Society and ask for their consideration and adoption.

Dr. Morris, on behalf of the Curators, moved that the Curators be allowed to deposit the collection of rocks and minerals in the basement of the Society's hall in the Wagner Free Institute, or elsewhere, at their discretion, in the name of the Society, and under proper guarantees for their preservation and recovery. Adopted.

The rough minutes were then read, and the Society was adjourned by the presiding officer.

[NOTE BY THE SECRETARY.—There having been no quorum for the disposal of property, the adoption of the resolutions offered by the Committee on the Magellanic Fund and on the Hall remain inoperative.]

Stated Meeting, November 18, 1898.

Vice-President **Sellers** in the Chair.

Present, 15 members.

Letters were read from President Fraley, Prof. Hilprecht, Mr. Rosengarten, Mrs. Stevenson, and R. H. Mathews, of Queensland, Australia.

Dr. Frazer presented the proceedings of Officers and Council.

The paper by R. H. Mathews on "The Divisions of the Queensland Aborigines," was read by title and referred to the Secretaries.

Pending nominations 1432, 1464, 1469, 1470, 1471, 1472, 1474 were read, and new nominations 1475, 1476, 1477, 1478 and 1479 were read.

On motion of Dr. Frazer the resolution approved by the Officers and Council regarding the International Floating Institute was unanimously adopted (see minutes of October 21, 1898).

On motion of Dr. Frazer, it was ordered that when the Society adjourns, it adjourn to meet November 25, 1898.

DIVISIONS OF QUEENSLAND ABORIGINES.

(With Map, Plate XIII.)

BY R. H. MATHEWS, L.S.

(Read November 18, 1898.)

In an article on the "Initiation Ceremonies of Certain Tribes of Australian Aborigines," published in the Proceedings of this Society, Vol. xxxvii, No. 157, pp. 54–73, I established the boundaries of the different organizations spread over the whole of New South Wales. In the present article it is intended to show the limits of the aboriginal nations inhabiting that portion of Queensland lying between the northern boundary of New South Wales and the nineteenth parallel of south latitude.

Each of these nations is composed of certain communities or aggregates of tribes who adopt identical section or class divisions, the particulars of which are explained under each head in the following pages, and the boundaries of the nations are accurately defined on the accompanying map. Each nation has been named after one or two of the tribes whose section or class divisions were first reported in it, and they are numbered on the map to correspond with the numbers given in the letter-press.

On the map referred to there is also represented the dividing line, AB, between the area in which circumcision is practiced, and that in which such rite is not in force. From B, this line continues in the same northerly direction till it meets the shore of the Gulf of Carpentaria. The continuation of this line southerly from the point A passes through the northwest corner of New South Wales, and its position is fixed on the map of that colony accompanying my paper read before this Society March 18, 1898.

No. 1. The Dippil Nation.

The country occupied by this nation, No. 1 on the map, extends from the Upper Clarence in New South Wales to Port Curtis in Queensland. On the east it is bounded by the sea-coast, and on the south, west and north by the distinguishing line marked upon the map, and includes the Brisbane, Mary, Burnett, Dawson, Upper Condamine and other rivers; together with Moreton, Stradbroke, Fraser and other islands on the adjacent coast. The following are a few of the principal and best known tribes who were formerly spread over this tract of country: Dippil, Turrubul, Paiamba, Kitabool, Kaiabara, Kooranga, Goonine, Murrungama.

The people are divided into two primary groups, called Deeajee and Karpeun; the former is again divided into two sections, called Bunda and Derwine, and the latter into two, called Banjoora[1] and Barrang. The following synopsis shows which sections may intermarry, and to what section the children belong:

---

[1] In the Wide Bay district, Balcoin is used instead of Banjoora, with the feminine equivalent Balcoingan.

GROUP.	SECTION.		OFFSPRING.	
	HUSBAND.	WIFE.	SONS.	DAUGHTERS.
Karpeun	Barrang	Bundagan	Derwine	Derwinegan
	Banjoora	Derwinegan	Bunda	Bundagan
Deeajee	Bunda	Barrangan	Banjoora	Banjooran
	Derwine	Banjooran	Barrang	Barrangan

Descent is always reckoned on the female side, the children taking the group and totem name of their mother. They do not, however, belong to her section, but take the name of the other section in their mother's group, as exemplified in the above table.

The pair of sections, Barrang and Banjoora, forming the group Karpeun, invariably marry the Bunda and Derwine pair, of the group Deeajee, but the rules of intermarriage of the individual sections constituting the groups is different in different parts of the tribal territory. For example, in some districts, instead of the rules of marriage following the order laid down in the foregoing table, a Barrang, male, marries a Derwine, female, and *vice versa*; a Banjoora, male, marries a Bunda, female, and *vice versa*. The descent of the children is not, however, affected by this variation —the offspring of a Derwinegan being always Bunda, no matter whether she marries a Banjoora or a Barrang husband. This law applies, *mutatis mutandis*, to the offspring of the women belonging to the other three sections.

Although marriages are generally regulated by the rules set out in the above table, and in the last paragraph, yet there are what I have called family or sectional regulations, under which a man may, in certain cases only, marry a woman belonging to his own section, but of a different totem to that to which he himself belongs. For instance, a Barrang Opossum might be allowed to marry a Barrangan Porcupine. Marriage between persons of the same totem is strictly prohibited.[1]

The totems belonging to each of the primary groups are common to the two sections of which it is composed. Thus, the totems attached to Karpeun are common to the sections Barrang and Banjoora, and the Deeajee totems are common to the Bunda and Derwine sections. I have found that certain totems which belong to Karpeun in a given district are reported to be attached to Deeajee in a different part of the tribal territory. It may be stated that I have observed similar local disagreements among the totems of other organizations.[1]

---

[1] "The Kamilaroi Class System of Australian Aborigines," *Proc. Roy. Geog. Soc. Aust.* (Q.), x, 23–24.

In the tribes inhabiting the country on the heads of the Clarence and Condamine rivers, the following are some of the totems attached to the group Karpeun: kangaroo-rat, parrot, turtle, carpet snake, eaglehawk, codfish, sea, brown kangaroo, crow, opossum, scrub turkey and porcupine. Among the totems of the Deeajee group in the same district may be enumerated the plain turkey, red kangaroo, bat, common magpie, wallaroo, black snake, native cat, emu, iguana and platypus.

Mr. A. W. Howitt reports that in the Turrubul tribe, one of those included in this Nation, "descent is counted through the male."[2] In another place he makes the same assertion in regard to the Kaiabara, also belonging to this Nation.[3] There is, however, no question that he is in error in both instances, and has evidently been misinformed. I have drawn attention to the matter now, because on a former occasion I was misled by Mr. Howitt's conclusions respecting the line of descent of the Kaiabara tribe.[4] I have since, however, from personal inquiry, reported that descent is through the mother.[5]

I have before given the Rev. William Ridley the credit of being the first to report the Turrubul and Dippil tribes from Moreton Bay to Wide Bay, whence Mr. E. Palmer traced a similar organization to Port Curtis.[6] I am the first to publish the existence of identical divisions on the sources of the Clarence and Dumaresq rivers; down the Condamine, and across the country to the Dawson, including that river and its tributaries, as shown upon the map.

---

[1] *Journ. Roy. Soc. N. S. Wales*, xxxi, 170.

[2] *Trans. Roy. Soc. Victoria* (1889), i, 102.

[3] *Journ. Anthrop. Inst.*, xviii, 50.

[4] *Proc. Roy. Geog. Soc. Aust.* (Q.), x, 29.

[5] *Journ. Roy. Soc. N. S. Wales*, xxxii, 81–82.

[6] *Loc. cit.*, p. 81.

The names of the groups Deeajee and Karpeun, and the equivalence of the four sections to those of the Kamilaroi tribes, have also been first reported by me.

No. 2. THE KOGAI-YUIPERA NATION.

The name is adopted from the Kogai of the Maranoa and Yuipera of Mackay, the two tribes whose divisions were first made known in this area. The immense extent of country covered by the tribes and communities constituting this nation can be understood better by a reference to the map than by any description of it. In a former paper, to which the reader is referred,[1] I detailed the original work done by the Rev. William Ridley, Mr. R. B. Smyth, Mr. E. M. Curr, and Mr. E. Palmer, among different tribes of this organization.

I have traced the same section names among the tribes of the Warrego, Paroo, Bulloo, Barcoo, Thomson, Diamantina, and other rivers, thus covering all the country in which the section or class names had not been particularized by previous writers. The following are a few out of a large number of tribes included in my inquiries: The Gnoree tribe of the Middle Warrego, the Murgoan of the Bulloo, the Moothaburra and Birria of the Thomson, the Koonkerri of the Barcoo, the Kurrawulla of the Diamantina, the Banthamurra of the Wilson, etc.

In all the tribes of this Nation the people are divided into four sections, called Woongo, Koobaroo, Bunburri and Koorgilla, or else mere variations of these names. The people appertaining to the Woongo and Koobaroo sections together form a group called Wootaroo, and the Bunburri and Koorgilla sections constitute the group Yungaroo. In my previous article already referred to,[2] I gave a tabular arrangement of the groups and sections of the Yuipera tribe at Mackay, as reported by Mr. R. B. Smyth, in 1878, but as the names are slightly different in the interior, it will be better to supply a new table, as follows:

---

[1] *Journ. Roy. Soc. N. S. Wales*, xxxii, 78–80.

[2] *Journ. Roy. Soc. N. S. Wales*, xxxii, 79.

GROUP.	SECTION.		OFFSPRING.	
	HUSBAND.	WIFE.	SONS.	DAUGHTERS.
Wootaroo	Woongo Koobaroo	Bunburrian Koorgillan	Koorgilla Bunburri	Koorgillan Bunburrian
Yungaroo or Mallera	Bunburri Koorgilla	Woongoan Koobarooan	Koobaroo Woongo	Koobarooan Woongoan

Mr. E. M. Curr reported that the name Mallera was used on the Belyando and other rivers instead of Yungaroo, and I have found the same name on the Warrego, Thomson and elsewhere.

As every man and woman in the community bears the name of an animal, or some other natural object, it follows that there will be an aggregate of diverse totems known by the collective title of Wootaroo, and a corresponding variety of totems will be distributed under the distinguishing name of Yungaroo or Mallera. The tribes of this organization are so widespread that I shall not at present occupy the space to enumerate the lengthy lists of totem names collected by me in the various districts, but will reserve this task for a future occasion.

Although the section names are practically the same over the vast territory shown as No. 2 on the map, yet the dialects and customs of the people are more or less diverse in different parts of it. Throughout a wide zone of the western end of this nation, all the males are circumcised, and other rites are performed, which have been described by me elsewhere. The line from A to B on the map separates those tribes who practice circumcision from those who do not. Such a boundary would necessarily be varied slightly at different times by conquest, or by the intermarriage of neighboring tribes on either side.

The southwest and west boundaries of Queensland, separating that colony from South Australia, being arbitrary geodetic lines, cannot be expected to coincide with the boundaries of the aboriginal nations. For the sake of simplicity, however, the Queensland boundary has, for the present, been adopted as the southwest limit of the Kogai-Yuipera people. I am preparing a map dealing with some South Australian tribes, on which the actual boundary between them and the Queensland communities will be shown in its proper place. The northern boundary of the Barkunjee nation, No. 5 on the map hereto annexed, will also be more particularly defined in my forthcoming article.

No. 3. THE KOOINMERBURRA NATION.

This nation comprises several small tribes, inhabiting the coastal district from Port Curtis *via* Keppel Bay, Port Bowen, Cape Townshend and Shoalwater Bay to Broad Sound, together with Long Island, Curtis Island and some smaller ones off the coast. On the south they were bounded by the Dippil, and on the west and north by the Kogai-Yuipera nations, as represented by a distinguishing line upon the map, Pl. XIII. The community is divided into two intermarrying groups, having the same names as their western neighbors, but with subdivisions bearing a different nomenclature. The primary group Wootaroo is divided into two sections, called Moonal and Karilburra, and the Yungaroo group into two, called Kooealla and Koorpal.

The names of the groups and sections, showing how they intermarry, and the names of the respective divisions to which the children belong, will be readily understood by referring to the following table:

GROUP.	SECTION.		OFFSPRING.	
	HUSBAND.	WIFE.	SONS.	DAUGHTERS.
Wootaroo	Moonal Karilburra	Kooeallan Koorpalan	Koorpal Kooealla	Koorpalan Kooeallan
Yungaroo	Kooealla Koorpal	Moonalan Karilburran	Karilburra Moonal	Karilburran Moonalan

Moonal and Karilburra are equivalent to Murri-Kubbi, and Kooealla and Koorpal to Kumbo-Ippai, of the Kamilaroi and Wiradjuri communities in New South Wales.

In this community descent is always reckoned on the female side, the same as in the two adjoining nations, the children of both sexes taking the totem name of their mother. The undermentioned are a few of the totems common to Moonal and Karilburra: curlew, wallaby, rain, russet hawk, bat, yellow-bellied snake. The Kooealla and Koorpal sections have the following totems amongst others: crow, boomerang, jackass, eaglehawk, salt water perch.

The intermarriage of certain totems belonging to the same section, referred to in my explanation of the marriage laws of the Dippil nation, also prevails in the Kooinmerburra community. For example, a Moonal might, under certain restrictions, marry a Moonalan of a totem different to his own.

For the particulars of the social structure of the Kooinmerburra, and their geographic range, I am much indebted to Mr. William H. Flowers, one of my most valued correspondents, who took a deal of trouble in replying to my inquiries. In 1894, in an article treating of another tribe,[1] I incidentally referred to the Kooinmerburra divisions reported by Mr. Flowers. The divisions of this tribe have also been briefly mentioned by Mr. A. W. Howitt.[2] The full details given in the present article, and the map defining the boundaries of the tract of country occupied by all the tribes of this organization, have never been published until now.

EXPLANATION OF PLATE XIII.

No. 1. The Dippil nation, at its southern end, extends a little way within the New South Wales frontier—the whole of the remainder being situated in Queensland. Moreton and Stradbroke Islands appertain to this organization.

No. 2. The Kogai-Yuipera nation adjoins the northern boundary of the Barkunjee and Kamilaroi nations of New South Wales, which encroach some distance within Queensland territory. All the tribes occupying the country to the west of the line AB practice the rite of circumcision, but to the east of that line the custom is not in force.

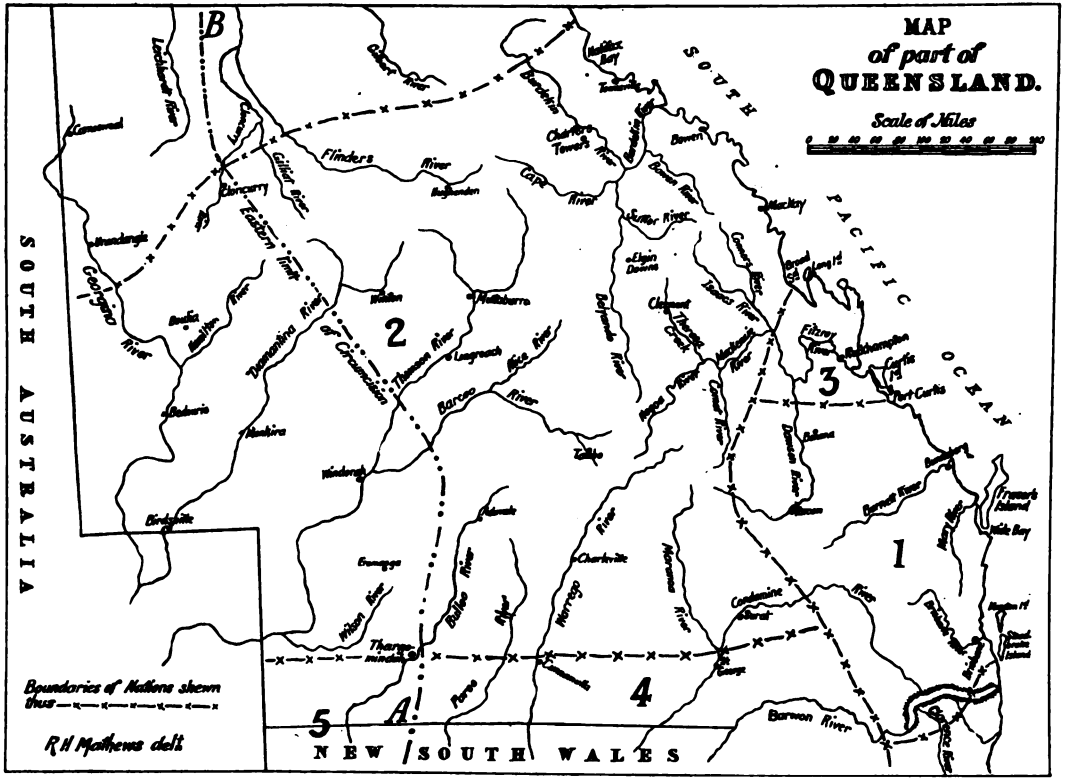
No. 3. The Kooinmerburra nation inhabits a comparatively small territory fronting the sea-coast for some distance north and south of the Fitzroy river.

No. 4 is the northern extremity of the country of the Kamilaroi

---

[1] *Proc. Roy. Geog. Soc. Aust.* (Q.), x, 27.

[2] *Journ. Anthrop. Inst.*, xiii, 341.


MAP
of part of
QUEENSLAND.
Scale of Miles
0 20 40 60 80 100 20 40 60 80 200
SOUTH PACIFIC OCEAN
SOUTH AUSTRALIA
NEW SOUTH WALES
1
2
3
4
5
A
B
Halifax Bay
Townsville
Burdekin River
Charters Towers
Bowen
Bowen River
Mackay
Broad Sd.
Long Id.
Cape River
Suttor River
Elgin Downs
Connors River
Isaacs River
Clermont
Theresa Creek
Belyando River
Mackenzie River
Fitzroy River
Rockhampton
Curtis Id.
Port Curtis
Nogoa River
Comet River
Dawson River
Bundaberg
Burnett River
Fraser's Island
Wide Bay
Mary River
Condamine River
Surat
St. George
Brisbane
Brisbane River
Stradbroke Island
Moreton Id.
Barwon River
Clarence River
Maranoa River
Charleville
Warrego River
Cunnamulla
Paroo
Bulloo River
Adavale
Thargomindah
Wilson River
Eromanga
Windorah
Barcoo River
Tambo
Alice River
Longreach
Thomson River
Muttaburra
Winton
Hughenden
Flinders River
Gilbert River
Gilliat River
Cloncurry
Leichhardt River
Camooweal
Urandangie
Georgina River
Boulia
Hamilton River
Diamantina River
Bedourie
Monkira
Birdsville
Eastern limit of Circumcision
Boundaries of Nations shewn thus —×—×—×—×—×
R H Mathews delt.

nation, which crosses the boundary between the colonies of Queensland and New South Wales.

No. 5 represents a portion of the Barkunjee territory, which also overlaps the Queensland frontier.

For particulars of the country occupied by the Kamilaroi and Barkunjee nations, and the eastern limit of the custom of circumcision in New South Wales, the reader is referred to my paper on the "Initiation Ceremonies of Australian Tribes," published in the PROCEEDINGS of this Society, Vol. xxxvii, pp. 54–73, Pl. V.

Adjourned Meeting, November 25, 1898.

Vice-President SELLERS in the Chair.

Present, 21 members, including seven members of the Officers and Council.

By unanimous consent, Dr. Frazer offered the resolutions of the Committees on the Magellanic Fund and of the Hall (see proceedings of meeting November 4, 1898), and they were unanimously adopted.

Mr. Dickson, on behalf of the Committee on the Rules of Administration and Order, called for the consideration of the same, and, after discussion and amendment, they were adopted in the form entered in the minutes of this date.

On motion of Dr. Frazer, it was unanimously ordered that a ballot be prepared for the coming annual election by the coöperation and with the approval of all the Secretaries, on which shall be printed the names of all the offices for which elections are to be held, and the number of candidates for each office in the order in which they shall be nominated; that furthermore, a copy of the ballot be sent to every member who receives notice of the meeting.

There being no further business before the Society, the meeting was adjourned by the presiding officer.

Stated Meeting, December 2, 1898.

Vice-President SELLERS in the Chair.

Present, 11 members.

Letters were read from J. B. Hatcher accepting membership, and from the London Library.

The list of donations to the Library was laid upon the table. The Librarian reported that the third and fourth volumes of the manuscript Logan papers, and one volume of Penn's letters and ancient documents, which had been loaned by order of the Society to the Historical Society of Pennsylvania on April 23, 1879, had been returned.

The Treasurer read his annual report, and it was ordered that this and all other annual reports be spread upon the minutes.

The annual reports of the Treasurer, the Curators and of the Standing Committees were read.

Mr. Dickson and Dr. Morris gave notice of certain proposed amendments to the Rules of Administration and Order.

The Society was then adjourned by the presiding officer.

Stated Meeting, December 16, 1898.

Vice-President SELLERS in the Chair.

Present, 24 members.

A letter was read from Dr. Kendall, declining a renomination as Vice-President of the Society.

Dr. Frazer offered the following resolutions, which were unanimously adopted:

WHEREAS, Prof. Kendall has served the Society twenty-seven years, or from 1849 to 1876 (inclusive), as Secretary, and twenty one years, or from 1877 to date, as Vice-President;

Resolved, That the Society desires to express its high appreciation of Prof. Kendall's long and faithful services in its behalf.

Resolved, That the Society assures him of its continued confidence and affection, and wishes him the health and happiness which his unremitting labor for the good of others deserves.

A letter was also read from Mr. Robert Patterson, declining a renomination as a Councillor of the Society.

The Library Committee presented their annual report, which was accepted and ordered spread upon the minutes.

The report of the Finance Committee was read and ordered to be spread upon the minutes.

Nominations for Officers and Council for the ensuing year were then made.

The Judges and Clerks for the next annual meeting were elected.

The Tellers reported that the following-named gentlemen had been elected members of the Society:

Prof. Edward P. Crowell, Amherst, Mass.
Prof. William Knight, St. Andrews, Scotland.
Paul Leicester Ford, Brooklyn, N. Y.
Francis Rawle, Philadelphia.
Prof. Edward N. Keiser, Bryn Mawr, Pa.
Prof. Ernest William Brown, Haverford, Pa.
George F. Baer, Reading, Pa.
Hon. John Hay, Washington, D. C.
Henry S. Pancoast, Philadelphia.
Charles M. Hall, Niagara Falls, N. Y.

The amendments to the Rules of Administration and Order offered by Mr. Dickson at the meeting held December 2 were then unanimously adopted.

The amendments to the same Rules offered by Dr. Morris at the same meeting were lost.

The Society was adjourned by the presiding officer.

INDEX TO VOLUME XXXVII.

Page.

- Abbe; On the Altitude of the Aurora above the Earth's Surface 4
- Artiodactyls of the Uinta Formation, Selenodont; Scott 73
- Aurora above the Earth's Surface, Altitude of the; Abbe 4
- Asphalt resembling Gilsonite by the Distillation of a Mixture of Fish and Wood, The Production of; Day 171
- Australian Tribes, Divisions of; Mathews 151
  - Initiation Ceremonies of; Mathews 54
- Bitumens, Genesis of as related to Chemical Geology; Peckham 108
- Brinton; The Linguistic Cartography of the Chaco Region 178
  - On Two Unclassified Vocabularies from South America 321
- Chaco Region, The Linguistic Cartography of; Brinton 178
- Committees appointed, Standing 51
- Day; The Production of an Asphalt resembling Gilsonite, by the Distillation of a Mixture of Fish and Wood 171
- Declaration of Independence, Facsimile exhibited 81
  - A Note on the History of the Jefferson Draught Manuscript of; Hays 88
- Fort William Henry, MS. of a Journal kept during the Siege of; Hays 143
- Fraley, Frederick; Portrait of, presented 142, 162
- Grote; Specializations of the Lepidopterous Wing, the Pieri-Nymphalidæ 17
- Hays; A Note on the History of the Jefferson Manuscript Draught of the Declaration of Independence 88
  - MS. of a Journal kept during the Siege of Fort William Henry, August, 1757 143
- Herpetological Notes; Van Denburgh 139
- Initiation Ceremonies of Australian Tribes; Mathews 54
- Kansan Drift in Pennsylvania, Notes on; Williams 84
- Kendall, Resolutions in regard to Dr. 337
- Laws of the Society adopted 155
- Lesley, J. P.; Portrait of, presented 142, 165
- Librarian elected 7
- Linguistic Cartography of the Chaco Region, The; Brinton 178
- Magellanic Fund, Resolutions in regard to 325
- Mathews; Initiation Ceremonies of Australian Tribes 54
  - Divisions of Australian Tribes 151
  - Divisions of Queensland Aborigines 327
- Members deceased:
  - Bayard, Thomas F. 176
  - Bessemer, Sir Henry 54
  - Cattell, William C. 58
  - De Mortillet, Gabriel 320
  - Ebers, George M. 176
  - Foggo, Edward A 54
  - Gladstone, William E 170
  - Hall, James 176
  - Legge, James 58
  - Müller, Friederich 176
  - Parvin, Theophilus 52
  - Pepper, William 176
  - Pulzsky, Francis 176
  - Trimble, Henry 176
- Members elected:
  - Allen, Alfred H 170
  - Baer, George F 338

Members elected: *Page.*
- **Brown, Ernest William** 338
- **Bryant, Henry Grier** 170
- **Converse, John H.** 170
- **Crowell, Edward P.** 338
- **Darwin, George H** 53
- **De Lancey, Edward F** 170
- **Emmet, W. L. R** 53
- **Ford, Paul Leicester** 338
- **Greene, S. Dana** 53
- **Hall, Charles M** 338
- **Harkness, William** 170
- **Hay, John** 338
- **Hutchinson, Emlen** 170
- **Jayne, H. LaBarre** 170
- **Keiser, Edward N** 338
- **Knight, William** 338
- **Mengarini, G.** 170
- **Montgomery, Thomas H., Jr** 53
- **Pancoast, Henry S** 338
- **Patterson, Lamar Gray** 170
- **Pettee, William H** 170
- **Platt, Charles** 170
- **Prescott, Albert B** 170
- **Rawle, Francis** 338
- **Redwood, Boverton** 170
- **Scott, Charles F** 53
- **Stillwell, L. B** 53
- **Tiele, C. P.** 170
- **Whitfield, R. P** 170

Meetings, Adjourned 155, 336
- Stated 3, 7, 51, 52, 53, 54, 142, 154, 162, 175, 319, 324, 327, 337

Miller; On the Quarternion Group 312
Officers and Council elected 3
Old Broadside, with a Reference to the Throne of Congress; Sachse 45
Peale; Collection of Indian Antiquities, Photographs of 142
Peckham; The Genesis of Bitumens as related to Chemical Geology 108
Pennsylvania, Notes on Kansan Drift in; Williams 84
Pericles and Apollonius of Tyre, Shakespeare's; Smyth 206
Pieri-Nymphalidæ, Specialization of the Lepidopterous Wing; Grote 17
Quaternion Group, On the; Miller 312
Queensland Aborigines, Divisions of; Mathews 327
Richardson; Description of Four New Species of Rocinella, with a Synopsis of the Genus 8
Rocinella, Description of Four New Species, with a Synopsis of the Genus; Richardson. 8
Rules of Administration and Order adopted 336, 338
Sachse; An Old Broadside, with a Reference to the Throne of Congress 45
Scott; Preliminary Note on the Selenodont Artiodactyls of the Uinta Formation 73
Shakespeare's Pericles and Apollonius of Tyre; Smyth 206
Siege of Fort William Henry, A Journal Kept during; Hays 142
Smyth; Shakespeare's Pericles and Apollonius of Tyre 206
Specializations of the Lepidopterous Wing, the Pieri-Nymphalidæ; Grote 17
Standing Committees appointed 51
Throne of Congress, Old Broadside, with a Reference to; Sachse 45
Uinta Formation, Preliminary Note on the Selenodont Artiodactyls of; Scott 73
Van Denburgh; Herpetological Notes 189
Vocabularies from South America, On Two Unclassified; Brinton 34
Williams; Notes on the Kansan Drift in Pennsylvania 84

PROCEEDINGS

OF THE

AMERICAN PHILOSOPHICAL SOCIETY

HELD AT PHILADELPHIA FOR PROMOTING USEFUL KNOWLEDGE.

VOL. XXXVIII. JANUARY, 1899. NO. 159.

CONTENTS.

PAGE
Stated Meeting, January 6, 1899 3
A Note on William Penn's Commission for the Government of Pennsylvania During His First Visit to England in 1684. By I. MINIS HAYS, M.D. (with two plates) 4
Stated Meeting, January 20, 1899 7
Specializations of the Lepidopterous Wing; Parnassi-Papilionidæ. Part I. By A. RADCLIFFE GROTE, A.M. 7
Stated Meeting, February 3, 1899 21
Stated Meeting, February 17, 1899 22
Stated Meeting, March 3, 1899 23
Stated Meeting, March 17, 1899 23
Stated Meeting, April 7, 1899 24
Specializations of the Lepidopterous Wing; the Parnassi-Papilionidæ. Part II. By A. RADCLIFFE GROTE, A.M. (with three plates) 25
Chairman's Annual Discourse for 1899, on the Transmission of Energy by Electricity. By COLEMAN SELLERS, E.D., Vice-President 49
Stated Meeting, April 21, 1899 71
Stated Meeting, May 5, 1899 74
Divisions of North Australian Tribes. By R. H. MATHEWS, L.S. 75
On an Interesting Fragment of the "Book of the Dead." By RUDOLPH BUTI, Ph.D. 79
Calendar of the Correspondence of Brigadier-General George Weedon, U. S. A., with Celebrated Characters of the American Revolution 81
Calendar of the Correspondence of Richard Henry Lee and Arthur Lee 114
Stated Meeting, May 19, 1899 131

PHILADELPHIA:
THE AMERICAN PHILOSOPHICAL SOCIETY,
104 South Fifth Street.
1899

It is requested that all correspondence be addressed

To the Secretaries of the
AMERICAN PHILOSOPHICAL SOCIETY,
104 South Fifth Street,
Philadelphia, U. S. A.

Members will please communicate to the Secretaries any inaccuracy in name or address as given on the wrapper of this number.

It is requested that the receipt of this number of the Proceedings be acknowledged to the Secretaries.

Members who have not as yet sent their photographs to the Society will confer a favor by so doing; cabinet size preferred.

PROCEEDINGS

OF THE

AMERICAN PHILOSOPHICAL SOCIETY

HELD AT PHILADELPHIA

FOR

PROMOTING USEFUL KNOWLEDGE

VOL. XXXVIII.

JANUARY TO DECEMBER, 1899

PHILADELPHIA:
THE AMERICAN PHILOSOPHICAL SOCIETY.
1899.

PROCEEDINGS
OF THE
AMERICAN PHILOSOPHICAL SOCIETY
HELD AT PHILADELPHIA FOR PROMOTING USEFUL KNOWLEDGE.

VOL. XXXVIII. JANUARY, 1899. No. 159.

Stated Meeting, January 6, 1899.

Vice-President SELLERS in the Chair.

Present, 16 members.

Acknowledgments of election to and acceptance of membership were read from Messrs. Edward P. Crowell, Henry S. Pancoast, Edward H. Keiser, Ernest W. Brown, Francis Rawle, Paul Leicester Ford and Charles M. Hall.

The decease of Prof. Ezra Otis Kendall, at Philadelphia, on January 5, 1899, was announced and it was ordered that the President be requested to appoint a member to prepare an obituary notice of the late Vice-President of the Society.

The Judges of the annual election for Officers and Councillors held this day between the hours of two and five in the afternoon reported that the following-named persons were elected according to the laws, regulations and ordinances of the Society to the offices for the ensuing year:

President.

Frederick Fraley.

Vice-Presidents.

Coleman Sellers, Isaac J. Wistar, George F. Barker.

Secretaries.

I. Minis Hays, Frederick Prime, Samuel P. Sadtler,
Richard A. Cleemann.

Curators.

J. Cheston Morris, Benjamin Smith Lyman, Henry Pettit.

Treasurer.

Horace Jayne.

Councillors.

(For three years.)

William A. Ingham, Charles S. Wurts, George F. Edmunds, James T. Mitchell.

(For one year to fill an unexpired term.)

Henry C. Trumbull.

Dr. I. Minis Hays read a "Note on Penn's Commission for the Government of Pennsylvania during his Visit to England in 1684."

Dr. I. Minis Hays was nominated for Librarian for the ensuing year.

The Society was adjourned by the presiding officer.

A NOTE ON WILLIAM PENN'S COMMISSION FOR THE GOVERNMENT OF PENNSYLVANIA DURING HIS FIRST VISIT TO ENGLAND IN 1684.

(Plates I and II.)

BY I. MINIS HAYS, M.D.

(Read January 6, 1899.)

On March 4, 1681, Charles II granted a charter, in which he made William Penn full and absolute Proprietor of that dominion which is now called Pennsylvania, and invested him with the powers of government of the same. Penn sailed for America on the 6th of August of the following year and landed at New Castle, on the Delaware, on October 24. He at once set about establishing his government and aiding the Quakers, who had emigrated under his auspices, in regulating their affairs in the colony, until in 1684 the dispute between Lord Baltimore and himself concerning the boundary of their respective provinces and the critical condition into which other of his important affairs had been thrown by his enemies during his absence in America rendered his presence in England necessary.

He therefore departed for home in June, 1684, but before so doing it was necessary to provide for the government of his province in his absence, and to this end, he executed a commission on the same day that he set sail, lodging in the hands of the Provincial Council the powers of government vested in him, and he appointed Thomas Lloyd, who also held a commission to keep the great seal, its President.[1]

In the Minutes of the Provincial Council it is stated that "at a Councill held at New Castle the 18th of ye 6th Month 1684 a commission from ye Govr was read, Impowring the Provll Councill to act in the Governmt in his Stead, Ths. Lloyd being Presidt of ye same."[2]

In the Minutes of 31st of January, 1686, P.M., it is also stated that "The commission from ye Govr to ye Provll Councill Impowring them to act in his stead, with ye memorandum on the back side thereof was Read."[3]

Neither the text of this commission, nor the important memorandum on the back is given, nor, so far as I can learn, have they ever appeared in print. I have been so fortunate, however, as to find the original document among some unarranged papers in the possession of this Society, and it bears no marks upon it to show that it was ever recorded. It seems, therefore, desirable that the text of this important document should now be made available to students of the history of this Commonwealth, as well as the memorandum on its back, which is referred to in the second record in the Minutes of the Provincial Council, which was executed on the same day on board the Ketch Endeavour just as Penn was about to sail for home, and which very materially restricted the large powers he had just previously on the same day granted in the original instrument. It constitutes another example of what has frequently been observed, that man's first impulses are more generous than his second thoughts.

The following is the text of the commission:

---

[1] Minutes of the Provincial Council of Pennsylvania. Published by the State, Vol. i, p. 66. Harrisburgh, 1838.

[2] *Ibid.*

[3] *Ibid.*, p. 120.

"WILLIAM PENN PROPRIETARY AND GOVERN^{R} OF Y^{E} PROVINCE OF PENNSYLVANIA AND Y^{E} TERRITORIES THEREUNTO BELONGING.

"To y^{e} members of y^{e} Provincial Councill of y^{e} Province of Pennsilvania & y^{e} Territories thereunto belonging.

"Since it hath pleased God so to dispose of me as to call me by his Providence into England and ^{t}y it is requisite that y^{e} Power I have should be left to maintain & exercise Govern^{t} for y^{e} Good of the Province and Territories: To y^{e} end that y^{e} People may be sensible of y^{e} Intire Confidence I have in them w^{ch} which I hope will begett the like in them, to me & mine, I doo hereby committ y^{e} Power vested in me to you their chosen Provinciall Councill & do hereby Nominate & appoint my Trusty & Loving Friend Thomas Lloyd President of y^{e} same, he & you to Act & doo all things, that by Law and Charter you may doo for y^{e} Good of y^{e} Province, & not to y^{e} Detriment of me my Heirs & Assigns, which power shall remain as Granted, till further Ord^{d}. Given at Philadelphia y^{e} Sixth day of y^{e} Sixth Month One Thousand Six Hundred & Eighty-four being y^{e} Thirty-Sixth Year of y^{e} King's Reign & y^{e} Fourth of my Government.

"WM. PENN."

On the back of the commission is the following inscription in a different handwriting:

"Memor^{d}

"By the Power within expressed & mentioned I understand y^{e} use of the executive power cheifly as chuseing officers &c. Intending y^{t} all law y^{t} shall or may be made should receive and have my further determination, confirmination and consent or else to be voyd in themselves.

"Given y^{e} day of y^{e} within date on board the Ketch Endeavour.

"6th 6th mo. 1684. "WM. PENN."

A facsimile of the commission and of the memorandum endorsed thereon is appended:

Stated Meeting, January 20, 1899.

Vice-President SELLERS in the Chair.

Present, 12 members.

The death of Major Jedediah Hotchkiss, of Staunton, Va., a member of the Society, was announced.

A verbal communication was made by Mr. Wadamori, of Japan, upon " A New System of Mnemonics."

A paper entitled " Photometric Researches," by Prof. Hugo Seeliger, of Munich, Bavaria, translated and edited by Prof. A. W. Myers, of the University of Illinois, was offered for the *Transactions*, and on motion was referred to a Committee consisting of Profs. E. C. Pickering, C. L. Doolittle and M. B. Snyder.

A communication for the *Proceedings* from Mr. A. Radcliffe Grote, on " Specializations of the Lepidopterous Wing; the Parnassi-Papilionidæ. I," was read.

Dr. I. Minis Hays was elected Librarian for the current year.

Pending nominations Nos. 1477, 1478, 1480, and new nominations Nos. 1481, 1482, 1483, 1484, 1485, 1486, 1487, 1488 and 1489, having been read, the meeting was declared adjourned.

SPECIALIZATIONS OF THE LEPIDOPTEROUS WING; PARNASSI-PAPILIONIDÆ.

I.

BY A. RADCLIFFE GROTE, A.M.

(Read January 20, 1899.)

This communication embodies results obtained from a study of the neuration of the types of genera proposed in literature in the Papilionides. It may be considered as a contribution to phylogeny in the group, from the fact that it exhibits the characters of specialization recognized by me in the structure of the wings, while the inference is accepted that the more specialized are also the younger forms. It may also be looked upon as a contribution to taxonomy, because the differences noted may find their place in generic descriptions and serve to regulate the extension of minor groups of the species.

I have divided (February, 1897) the Butterflies, or diurnal Lepidoptera, into two major groups, which may be thus defined:

Vein ix of fore wing present; not more than one internal vein on hind wing . . . . *Papilionides.*
Vein ix of fore wing absent; at least two internal veins on hind wing . . . . . . *Hesperiades.*

The characters given above to the Papilionides seem, at least in combination, exclusive of all other hitherto discovered Lepidoptera. The opposed characters will not exclude larger groups of the Moths from the Hesperiades. With the latter the present study is only incidentally concerned. Following modern classificatory notions, I have given to the names of these two major groups of the Butterflies an accepted termination (*ides*), and I would attach to each the taxonomical value of a superfamily. This course seems to be additionally warranted if we accept my assumption that the two groups are not immediately connected, their phylogeny distinct and that no nearer blood-relationship exists between them. These two major groups of the Butterflies have, I am led to believe, developed themselves independently, so that the obvious characters which would unite them have been secondarily acquired, and constitute a parallelism in development. The absolute character of a primary nature which separates the Papilionides from the rest of the diurnals is the presence of vein ix on primaries. The neurational characters, used here to divide the Papilionides into family and subfamily groups, are in their nature secondary, gradational and recurrent; in other words, characters of specialization only.

CHARACTERS OF SPECIALIZATION.

The first direction in which specialization shows itself lies in the suppression of the media on both wings. In this generally expressed direction the Papilionides show a course parallel with that undertaken by the Pieridæ, with the difference that the middle branch of the media, vein iv$_2$, becomes cubital; whereas in the Pieridæ it becomes radial, as in the Hesperiades generally, with the exception of Leptidia, an aberrant pierine form in which this branch also becomes cubital on the hind wings. In the Lycænidæ-Hesperiadæ it remains central, while it becomes radial in the Nemeobiidæ, as in the Pieri-Nymphalidæ. The upper branch of the media, vein iv$_2$, ascends the radius in the specialized forms of the Papilionides, as in the Pieridæ, and does not remain permanently attached to the cross-vein, from the upper corner of the cell, as in the Nymphalids.

The second direction in which specialization shows itself lies in the suppression of the branches of the radius on the fore wings. The five-branched radius, exhibited in a generalized state in the Papilionidæ, becomes four-branched in the most specialized butterflies of the group I have yet examined, in *Parnassius apollo* and its very close ally, *Doritis mnemosyne.*

For the rest, the specializations of the neuration generally show themselves in absorption, so that I have laid it down as a principle that the amount of the specialization is measured by the extent of the absorption or disintegration.

The so-called "tails" to the hind wings in this group are prolongations of vein iv$_3$. They are probably to be regarded as characters of specialization, and they possibly had their origin as secondary sexual ornaments of the male sex, although now most of the females have followed suit. In certain Papilios in which the female is mimetic, the "tail" in this sex may have been abandoned after having been originally acquired.

NOMENCLATURE AND HOMOLOGY OF THE VEINS.

The ancestors of the Papilionides must have exhibited vein ix of the primaries, since this is evidently a retained and not an acquired character. I follow Comstock in numbering the loop at the base of vii as viii in the Hesperiades and other groups. This vein viii is absent in the Papilionides, where there is no place for it. It may have originated in a splitting of vii at base, and not be a relic of a longitudinal separate vein. In this case the number assigned to ix would be incorrect, but the numbering having been introduced, to change it would make confusion, although the vein itself would be homologous with vein viii of hind wings and not with vein ix of the same pair.

The cross-vein between cubitus and vii very gradually fades out in the more specialized forms of the Papilionides and finally disappears. It fades from its base, where it joins on to vii, upwardly, becoming a mere remnant in the Teinopalpidæ, extending below the cubitus. Mr. Quail has discovered a similar slight blotch in *Anosia*, and I believe correctly homologizes it with the cross-vein of *Papilio*. I have found it still more extended in *Heliconius*, where it reaches, running a little obliquely downward, to about the place where vi would be had this latter vein not faded completely out. In my preparation and the original photograph of *Heliconius* this fragment of the cross-vein is with difficulty to be seen, and I overlooked it at the time. I also failed to notice that *Heliconius* shows a trace of vein viii.

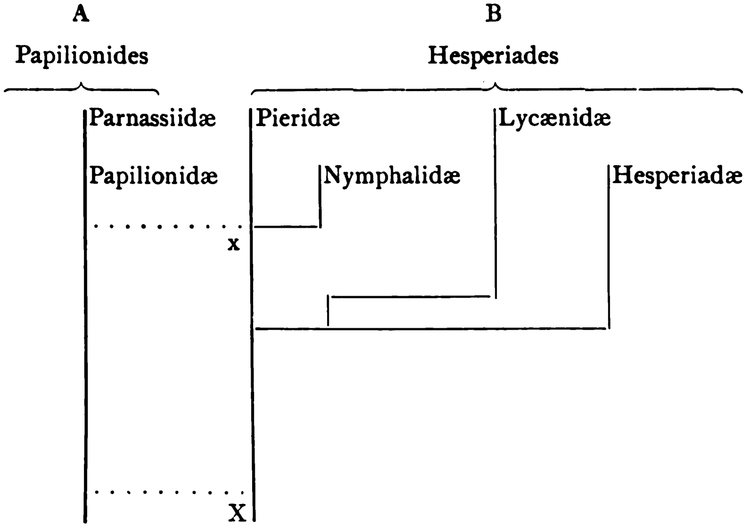
The presence of relics of a cross-vein below cubitus in the Limnadidæ and Heliconiidæ, homologous with that in *Papilio*, does not necessarily imply consanguinity between the groups. The hypothesis has suggested itself to me that the lepidopterous wing may have originally shown a series of longitudinal and independent veins, connected by a system of cross-veins, and without the present furcations of the branches of the media and radius. The disappearance of the cross-veins would allow of the contact of the longitudinal veins, and probably assist the shifting movements we now perceive in action (PROC. AM. PHIL. SOC., Jan., 1898). The cubital cross-vein would be a relic of these.

GENERAL CLASSIFICATION.

If we assume vein viii of the fore wing in the Hesperiades to be a splitting of the vein vii at base, it might not be held to be homologous with the vein viii, occupying the same position, in the Sphingides and other groups of moths. This supposition seems to me untenable. In the lycænid genera *Aurotis*, *Zephyrus* and *Feniseca* I do not perceive any difference in this vein from its appearance in the Hesperiadæ. It becomes simply more prominent and somewhat less strap-like and rigid in the moths. In any case, this vein viii, while allying the Hesperiades to the higher groups of moths, is absent in the Papilionides and is replaced by what I consider to be the undoubted relic of a true longitudinal vein, taking an opposite direction to vein viii, and running outwardly and downwardly to the inner margin of the wing, and which I have called vein ix. If the view is accepted that vein viii originates in a splitting of vein vii at base, then it might be held that this splitting occurred after vein ix had been gotten rid of, and that consequently butterflies with vein viii represent a succeeding stage in this respect. I believe to have shown that, in certain of the more specialized of the Hesperiades, vein viii gradually fades out. In the Nymphalids I find very faint traces of it only in certain Argynninæ. I have found no trace of it in any Satyrid. It has vanished in *Leptidia*, is present in *Pseudopontia*, and, while strong in *Colias*, is fainter in some of the other Pierinæ. Certain Lycænidæ appear to have lost it, or it is very faint, and this may be the case also with some Hesperians, though in this latter group it is usually quite legible. Conceding its variability, no better evidence perhaps of its power of extinguishment can be offered than that it is strongly marked in *Libythea* and *Limnas*, and that it is incomplete in the related *Heliconius*.

Let our theories as to viii be as they may, one thing seems clear: that no traces of vein ix of the Papilionides have been found in the Hesperiades, and that this latter group is held together, as opposed to the former, by the negative character of its absence.

My attempt therefore, to connect the Papilionides with the rest of the diurnals, has failed. In my first draft of the genealogical tree (1896–1897), and which is still pinned above my desk, I supposed that the point of contact might be with primitive forms, less specialized than the Hesperians. These would have all exhibited vein ix, which the Papilionides had retained, while the other ascending branch had lost it. I reproduce here this sketch, the readier since Dr. Chapman, in letters to me, has queried whether an analogous scheme might not work.



The point x is supposititious and, in my original sketch, marked with a query. I had endeavored also to connect the Papilionides with the Nymphalids. Aside from the major difficulty, the only point of similarity I could then find was the five-branched radius, which in both the Papilionidæ and in the Nymphalids was in a generalized condition. To this must be added traces of the cubital cross-vein in the Limnadidæ and Heliconiidæ. While too much importance should not be paid to a suppression of branches of the radius now in a fluid state, as in the Pieridæ and Saturniadæ, stress must be laid on the fact that throughout the Nymphalids the five-branched condition is retained, while in the Parnassians we have also a four-branched type, in which the more generalized five-branched condition has been very clearly abandoned. The only movement I have found in the Nymphalid radius consists of a transference of iii_2 to beyond the cell in the Heliconiidæ and certain long-winged forms, or in forms perhaps tending in that direction, such as *Thalerope*, *Araschnia*, *Melitæa* and *Euptoieta*; while in the long-winged forms, *Agraulis*, *Dione*, the vein iii_1 has followed suit. A trace of this movement is seen in *Argynnis*, but not in *Issoria lathonia*. I was also impressed by the fact that in the Papilionidæ vein iii_4 did not attain the apex of the primary wing, but this condition is not constant in the Nymphalidæ, and is abandoned in the Satyrids and *Libythea*. On the other hand, the differences between the Papilionides and Nymphalidæ are numerous. Vein iv_2, the middle branch of the media, becomes radial in the latter, in the former cubital, in specialization. Vein iv_3 also leaves the lower outer corner of the cell in the Papilionidæ, and, although this position is abandoned in the higher genera of the Parnassiidæ, still it may have been a primitive one, since it occurs now with the more generalized forms. The peculiarities of the papilionid wing are very strong, and notwithstanding the discovery of a remnant of the cubital cross-vein in *Anosia* (Danaus) by Mr. Quail, and by myself in *Heliconius*, I cannot find evidence sufficiently weighty to connect the groups from the neuration. But while the coincidences allow of some comparison of the Papilionides with the Pieri-Nymphalidæ, although an affinity appears to me to be illusory, it is impossible to consider them as representing in any nearer way an ancestral form of the Lycæni-Hesperiadæ.

Upon the generalized condition of *Hesperia* too much stress has, perhaps, been laid in literature. All the forms of which I have examined the neuration seem relatively specialized upon their peculiar plan of venation, of which the more modern and advanced outgrowths are to be found in the Lycænidæ, culminating in *Thecla*. But all the butterflies belonging to the Lycænid-Hesperid phylum seem relatively too specialized as to represent adequately the primitive form of the diurnals. Whatever the primitive form was like, the only character in which it may have resembled *Hesperia*, or the primitive form of the Charaxinæ, is that of the separation of the longitudinal veins. The primitive butterfly may have had separated veins, together with cubital cross-veins, of which we find a trace in the Heliconians and Limnads, and an anal vein, like the Papilionides, on the primaries. And, perhaps, by conjuring up a creature rejoicing in apparently residual features, we might attain to a picture in somewhat like manner as Gabriel Max has painted Haeckel's *Pithecanthropus alalus europæus*. But the muse of morphology, as I am now able to understand her, abandons me at this juncture, with the unconnected threads of the groups A and B, the Papilionides and Hesperiades, dangling downwards into the abyss of Time, kept apart by the presence of vein ix of primaries in the one and its absence in the other.

The object of my communications upon the wings of butterflies, of which this series is the last, has, however, been attained in demonstrating that modern classificators (I need not recapitulate their names) have been in error in intercalating the Swallowtails between the Blues and the Skippers. In thus doing violence to the characters of the insects, they have separated two allied groups by the interpolation of a third, not at all nearly related to either. I have further shown that we cannot bring in the Papilionides *after* the Hesperiadæ, since this course would break the sequence of character which allies the Hesperiades with the higher groups of the moths, the Sphingides, Saturniades, Bombycides (Agrotides). I do not assert a belief that the Hesperiades have sprung from common ancestors with these, but I find nothing in the neuration to render the idea improbable. And I am compelled to add, upon such evidence as is accessible to me, that I cannot say the same of the Papilionides, all connection of which with any of the above-mentioned groups appears to me to present a high degree of improbability. What discoveries await us in the future no one can say, and a naturalist can only come to a conclusion upon the material before him.

The notion that the Papilionides are generalized forms appears to me to be alike overstated. I lay especial stress upon the fact that the hind wings show but one internal vein, whereas all the Hesperiades show two at least. How the outer vein has been gotten rid of is plainly to be traced in the Papilionides, viz., in the same manner as the shortening and weakening of the inner vein has been gradually effected, from where it is stout and long, as in *Ornithoptera*, to where it becomes weaker, more curved and shorter, in *Parnassius*. This shortening of the vein is accompanied by a hollowing away of the tegument along the inner margin. A perfect parallel in this movement is sustained between the Papilionides and Saturniades. More than this: I believe I have found in the rounded and full inner margin of the secondaries in *Ornithoptera* an earlier stage of the hollowed margin of *Papilio*. For this reason, among others, I look upon *Ornithoptera* as being a relatively generalized form in the group. The ancestors of *Papilio* might have had two internal veins on secondaries, and in this they would have resembled the Hesperiades. From this point of view the inference is irresistible that we should commence our lists with the Papilionides. The specialization of the radius on fore wings keeps pace with the shortening of vein viii on hind wings in the Parnassiidæ.

In taking a fresh view of the evolution of the neuration, one is only too liable to overlook minor characters, or again to lay undue stress upon them. But, if I am correct in my major conclusions, if the theory in the main adequately explains the facts, such faults may be eliminated and forgiven. A well-founded division of the butterflies into two larger groups, of equal morphological value, must be considered as a gain to taxonomy, while it eases the study of the waste of butterflies to a hitherto unknown extent. I try to show, not only that the Parnassi-Papilionidæ belong together, but that all the rest of the butterflies are correctly associated in a second group. I have broken the Papilionides away, not only from their supposed affinities with the Whites, but from their incongruous placement with the Skippers also. In the former case I differ from Mr. Reuter, in the latter from Mr. Scudder. It seems to me that light is thus thrown upon a subject on which much has been written which must now appear purposeless, while the new course would enable us to carry with greater certainty the apparatus of classification along the road of phylogeny.

MATERIAL.

The authority for the generic names and types which I have here consulted, is Mr. Scudder's *Historical Sketch of the Generic Names Proposed for Butterflies*, Salem, 1875. I regret not to have been able to procure information or material of several generic types published since this date in the Papilionidæ. For specific determinations I am largely indebted to Dr. O. Staudinger and A. Bang-Haas, Blasewitz, Dresden. As far as possible I have studied the neuration of the female sex, since here the question of secondary sexual character is for the most part excluded. Where the male alone has been examined the sex is indicated. Following Mr. Scudder's work, I have omitted to cite the author to the generic type.

Classification of the Papilionides.

The characters are taken from the position of the veins and their condition. These characters are offered by the neurational movement peculiar to the Papilionides, of which they constitute existing stages, and are hence secondary and characters of specialization only. They are here amplified from my original communication forms. It may also be looked upon as a contribution to taxonomy, because the differences noted may find their place in generic descriptions and serve to regulate the extension of minor groups of the species.

I have divided (February, 1897) the Butterflies, or diurnal Lepidoptera, into two major groups, which may be thus defined:

Vein ix of fore wing present; not more than one internal vein on hind wing . . . . *Papilionides.*
Vein ix of fore wing absent; at least two internal veins on hind wing . . . . . . *Hesperiades.*

The characters given above to the Papilionides seem, at least in combination, exclusive of all other hitherto discovered Lepidoptera. The opposed characters will not exclude larger groups of the Moths from the Hesperiades. With the latter the present study is only incidentally concerned. Following modern classificatory notions, I have given to the names of these two major groups of the Butterflies an accepted termination (*ides*), and I would attach to each the taxonomical value of a superfamily. This course seems to be additionally warranted if we accept my assumption that the two groups are not immediately connected, their phylogeny distinct and that no nearer blood-relationship exists between them. These two major groups of the Butterflies have, I am led to believe, developed themselves independently, so that the obvious characters which would unite them have been secondarily acquired, and constitute a parallelism in development. The absolute character of a primary nature which separates the Papilionides from the rest of the diurnals is the presence of vein ix on primaries. The neurational characters, used here to divide the Papilionides into family and subfamily groups, are in their nature secondary, gradational and recurrent; in other words, characters of specialization only.

CHARACTERS OF SPECIALIZATION.

The first direction in which specialization shows itself lies in the suppression of the media on both wings. In this generally expressed direction the Papilionides show a course parallel with that undertaken by the Pieridæ, with the difference that the middle branch of the media, vein iv_2, becomes cubital; whereas in the Pieridæ it becomes radial, as in the Hesperiades generally, with the exception of Leptidia, an aberrant pierine form in which this branch also becomes cubital on the hind wings. In the Lycænidæ-Hesperiadæ it remains central, while it becomes radial in the Nemeobiidæ, as in the Pieri-Nymphalidæ. The upper branch of the media, vein iv_1, ascends the radius in the specialized forms of the Papilionides, as in the Pieridæ, and does not remain permanently attached to the cross-vein, from the upper corner of the cell, as in the Nymphalids.

The second direction in which specialization shows itself lies in the suppression of the branches of the radius on the fore wings. The five-branched radius, exhibited in a generalized state in the Papilionidæ, becomes four-branched in the most specialized butterflies of the group I have yet examined, in *Parnassius apollo* and its very close ally, *Doritis mnemosyne.*

For the rest, the specializations of the neuration generally show themselves in absorption, so that I have laid it down as a principle that the amount of the specialization is measured by the extent of the absorption or disintegration.

The so-called "tails" to the hind wings in this group are prolongations of vein iv_3. They are probably to be regarded as characters of specialization, and they possibly had their origin as secondary sexual ornaments of the male sex, although now most of the females have followed suit. In certain Papilios in which the female is mimetic, the "tail" in this sex may have been abandoned after having been originally acquired.

NOMENCLATURE AND HOMOLOGY OF THE VEINS.

The ancestors of the Papilionides must have exhibited vein ix of the primaries, since this is evidently a retained and not an acquired character. I follow Comstock in numbering the loop at the base of vii as viii in the Hesperiades and other groups. This vein viii is absent in the Papilionides, where there is no place for it. It may have originated in a splitting of vii at base, and not be a relic of a longitudinal separate vein. In this case the number assigned to ix would be incorrect, but the numbering having been introduced, to change it would make confusion, although the vein

Correspondence was submitted as follows:

From Hon. John Hay, accepting membership in the Society.

From the President, announcing the appointment of the following Committee on the Scheme of Classification proposed by the International Conference on Scientific Literature, to wit, the Library Committee and the Librarian.

From Vice-President Sellers, announcing the appointment of the following Committee on the paper of Prof. Baur and Dr. Case: Prof. Scott, Dr. Jayne and Mr. Arthur E. Brown.

The Librarian presented a list of donations to the Library.

The report of the Committee on Prof. Seeliger's paper was presented and accepted, and it was ordered that the decision of the Society thereon be reported to Prof. Meyers by the Secretaries.

Prof. George F. Barker made a communication on Hertzian waves.

Pending nominations Nos. 1477, 1478, 1480 to 1487, 1489 to 1495 and new nominations Nos. 1496 and 1497 were then read.

The Society was adjourned by the presiding officer.

Stated Meeting, April 7, 1899.

Vice-President Wistar in the Chair.

Present, 5 members.

The minutes of the stated meeting of March 17 were read and approved.

An invitation of the Imperial Academy of Sciences of St. Petersburg to attend the fiftieth anniversary of the establishment of the Central Physical Observatory, on April 1–13, was read.

On motion of Dr. Hays, the Secretaries were requested to acknowledge receipt of the same and express regret that the time was too short to permit of sending a delegate to attend the anniversary.

The deaths of Prof. Othniel Charles Marsh, of New Haven, on March 18, in his sixty-eighth year; of Richard A. Tilghman, of Philadelphia, on March 24, in his seventy-fifth year, were announced.

On motion of Mr. Prime, Gen. I. J. Wistar was appointed to prepare an obituary notice of Mr. Tilghman.

A paper was read on "Specializations of the Lepidopterous Wing: The Parnassi-Papilionidæ, II," by A. Radcliffe Grote, A.M.

The Society was adjourned by the presiding officer.

SPECIALIZATIONS OF THE LEPIDOPTEROUS WING: THE PARNASSI-PAPILIONIDÆ.

II.

(Plates III, IV and V.)

BY A. RADCLIFFE GROTE, A.M.

(Read April 7, 1899.)

Fam. III. PAPILIONIDÆ.

The cubital cross-vein is always distinct, while in certain forms it does not connect inferiorly with vein vii, but is arrested at the submedian fold (vein vi). This latter is bent downwards to vein vii, beyond the cross-vein, in those types in which the cross-vein attains vein vii (see Comstock's figure in *Evolution and Taxonomy*, Plate ii, Fig. 2), and appears again within the cross-vein to base of wing. In certain forms the submedian fold is continuous from base to external margin, and the cross-vein then rests on this fold and does not reach vein vii (*e. g.*, *Eurycus cressida, Pathysa antiphates, Iphiclides podalirius*). The following table separates neurational groups, and, as far as possible, the genera. The hairy male pockets on the hind wing I have not specially examined. In the nomenclature of the veins I continue to follow Comstock.

contained in ***Mittheilungen aus dem Roemer-Museum***, Hildesheim, No. 8 (February, 1897).

On primaries vein iv$_1$ is radial or radially inclined,
  vein iv$_2$ is cubital.
    No traces of cubital cross-vein . . . . PARNASSIIDÆ.
      Radius four-branched, specialized ***Parnassiinæ.***
      Radius five-branched, generalized ***Zerynthianæ.***
    Traces of cubital cross-vein . . . . . TEINOPALPIDÆ.
On primaries vein iv$_1$ from, at or near middle of
  cross-vein; vein iv$_2$ from the lower outer corner of cell equidistant, or nearly so, between
  iv$_1$ and iv$_2$.
    A cubital cross-vein reaching vi or vii . PAPILIONIDÆ.

Fam. I. PARNASSIIDÆ.
Subfam. 1. *Parnassiinæ.*

The radius is four-branched, specialized. There appear to be only two genera in this subfamily, since *Doritis*, with the type ***mnemosyne***, does not seem distinct from ***Parnassius***, with the type ***apollo.*** These two genera may be separated as follows:

Vein iv$_1$ from radius beyond the cell . . . . 1. Parnassius.
Vein iv$_2$ from cross-vein . . . . 2. Hypermnestra.

Parnassius apollo.

In all the species of *Parnassius* I have yet seen, vein iv$_1$ issues from radius, but since in the succeeding group this vein is fluid in *Zerynthia*, the character may not always hold. In both *apollo* and *mnemosyne* vein iii$_2$ arises a little before the point at which the cross-vein joins the radius, but, in *Hypermnestra*, *at* this point. I have been hitherto in error as to the absorption of i and ii at base in *Parnassius*. The lower vein is partially degenerate, but distinctly present in both *apollo* and *mnemosyne*. My figures must be corrected in this respect. This Papilionid feature is then retained throughout the group. It is the lower branch, the base of vein ii, which here seems to fade away. The upper branch, vein i, is united by a cross-vein, according to Comstock, with vein ii in *Papilio*. This short cross-vein appears then to become fused with and a continuous part of vein ii, its real base, while all that remains of it is the "præcostal spur." This may be the true termination of vein i, the alternative being that the "præcostal spur" is homologous with the shoulder veins of the Lachneidæ. But, in *Papilio machaon*, it is the base of vein i which clearly shrinks, vein ii being strong and continuous. In *Parnassius* the præcostal spur appears to emerge from vein ii, and the cross-vein has become absorbed.

Hypermnestra helios (♂).

Characterized by the extreme diminution of the humeral cell of secondaries, which is so reduced as at first to escape notice. The position of vein iii_2 shows an advance upon *Parnassius*, while in that of iv_1 it lags behind its ally. Else the neuration of the two generally agrees.

Subfam. 2. *Zerynthianæ.*

This subfamily must take its name from *Zerynthia* Ochs., 1816, because *Thais* Fabr., 1807, which is the older title for the same type, is preoccupied (Scudder, *l. c.*, 279). Not observing this, I originally used for it the name *Thaidinæ*. No other author, so far as I know, had proposed this division of the Parnassiidæ, which in itself seems a natural one. The Zerynthianæ are intermediate, in the specialization of the wings, between the Parnassiidæ and the Papilionidæ.

Radius five-branched, generalized:
Internal vein (viii) of hind wings relatively short, not reaching anal angle .... *Archon.*
Internal vein (viii) of hind wings reaching anal angle:
    Hind wings without special prolongation of vein iv_3 .... *Zerynthia.*
    Hind wings with slight special prolongation of vein iv_3 .... *Luehdorfia.*
    Hind wings with a long "tail" to vein iv_3 and also shorter prolongations to veins v_1 and v_2 .... *Armandia.*
    Hind wings with only a long "tail" to vein iv_3 .... *Sericinus.*

Archon apollinus.

A character of specialization is found in the shortened and bent internal vein of secondaries which follows the inward curve of the margin, as in *Parnassius* and the Saturniades. This character is probably more recently acquired. The neuration else shares the main features of that of its group. The humeral cell is narrow and reduced, the lower vein (base of ii) being weaker. On primaries vein iv_1 springs from the cross-vein. Although the pallor of the ground color of the wings suggests the preceding subfamily, the pattern of ornamentation (on the value of which for taxonomical purposes I have been insisting upon for more than thirty years past) is distinctly Zerynthian. The discal blotches are intermediate between the bands of *Zerynthia* and the spots of the Parnassians and show the origin of the latter. The subterminal red-marked fasciæ are like *Zerynthia*. *Archon* may be regarded as a generalized form of *Parnassius*, showing the origin of the latter from *Zerynthia*-like ancestry.

Zerynthia polyxena.

The material examined shows that vein iv_1 is in a fluid state. In a female this vein leaves the extreme upper corner of the cell. In the male it has passed beyond the cell and issues from the radius. In a female of *rumina*, figured by me (*Mittheilung a. d. Roemer-Museum*, No. 8, Taf. 1, Fig. 2), it leaves the cross-vein. Not only this vein varies in position, but also vein iii_2, which is further removed outwardly in the specimen in which vein iv_1 leaves the radius. Sufficient material has not been examined to gauge the extent of these variations, but it seems unlikely that they are sexual. As compared with *Archon*, the internal vein of hind wings is less bent and reaches the anal angle, the humeral cell is a little wider, else the neuration generally agrees. Traces of a splitting of vein ii at base appear on fore wings.

Luehdorfia puziloi.

The neuration of the female examined agrees exactly with that of *Zerynthia rumina*. Except that the margin of secondaries is more uneven, and that vein iv_3 is produced into a short "tail," no differences whatever have been noted. Vein iv_1 leaves the cross-vein. The forms in which vein iv_1 is still attached to the cross-vein must be regarded as more generalized than those in which it has ascended the radius and is thrown off beyond the cell.

Armandia thaitina.

Vein iv$_1$ leaves the radius at the junction of the cross-vein. Vein iii$_2$ is well removed beyond the cell. In these characters *Armandia* attains the specialization of *Zerynthia*, but on secondaries the humeral cell is much extended. Vein iv$_3$ of secondaries is extended, forming a long and slightly spatulated "tail." The extension to vein v$_1$ is shorter, and that to v$_2$ is still more abbreviated. The internal vein reaches the anal angle, but it is curved as in the preceding genera, thus more specialized than *Sericinus*, in which it is straight. The long primaries and the tailed secondaries strongly remind one of the Papilionidæ. The pattern of ornamentation and the neuration are those of its group.

Mr. Scudder (*l. c.*, 121) spells the name of this butterfly "*thaidina*," but Staudinger (in litt.) gives the spelling which I have above adopted.

Sericinus telamon.

In this type the sexes differ greatly in color and markings. In the two specimens examined (det. Staudinger) it is, strange to say, the female which shows the more advanced type. But I infer that the differences noted are individual. In both, vein iv$_1$ leaves the cross-vein, a generalization as compared with *Armandia*, as is also the still larger humeral cell of the secondaries. But in the white male, vein iii$_2$ leaves the radius *before*, in the yellow, black-striped female just *after*, the point of jointure of the cross-vein. The internal vein on hind wings is straight, and this is a generalization as compared with all preceding generic types. The prolongation to vein iv$_3$ is very long and quite even in width, not spatulate. In this genus and *Armandia* the cubitus shows a slight scar, the relic of the vanished cross-vein.

So far as I am able to ascertain from accessible literature, I have here discussed the neuration of all the generic types yet proposed in the Parnassiidæ. It becomes quite clear, I hope, that the neuration assumes a more specialized type in the Parnassiidæ, as compared with the Papilionidæ, while retaining the essential feature characterizing the entire group. So far as I am aware, no contradiction exists to the view that, commencing our lists with the more specialized members of any group, we should in this case allow the Parnassiidæ to take precedence.

Fam. II. TEINOPALPIDÆ.

Specialization has carried this family, which consists of but a single type, entirely beyond the range of generic differentiation in the Papilionidæ. The neuration has submitted to changes similar to those characterizing the Parnassiidæ, changes of which I find no more than an indication in the Papilionidæ, so that in some respects it affords an intermediary type. The disintegration of the series of the median veins on primaries has progressed far beyond the present condition of any generic type in the Papilionidæ which I have been able to examine. Vein iv_1 has become radial, vein iv cubital, and the latter has abandoned its approximately central position and forms an unbroken curve with the cubitus. Thus the whole shape of the cell and cross-vein has undergone an important modification and the proper papilionid type of these parts has been abandoned. The cross-vein is much degenerate across the wider interspace which now intervenes between veins iv_1 and iv_2. The wing also recalls in its present condition that of *Charaxes*, except that iv_2 is cubital, while the long furcation of iii_4 and iii_5 accentuates the resemblance. The cubital cross-vein has practically vanished. There is a feeble notch on the lower edge of the cubitus and a clouding or thickening of the tegument as far as the submedian fold (vein vi). This submedian fold is always stronger at base, and, as we shall see in genera of Papilionidæ, the cubital cross-vein first disappears between it and vein vii, fading upwardly. The internal vein of hind wing is continued to anal angle and is straight. The "tail" to vein iv_3 is narrow and even (♀). Studying this type, it becomes clearer how the wing of the Papilionidæ may have given rise to the wing of the Parnassiidæ. It may be regarded as a lateral offshoot from the Papilionidæ.

With regard to the propriety of making *Teinopalpus* Hope a family type, there can be no question from the neuration, and when we add to this the peculiar structure of the mouth parts and body it should remove doubt. For, as I tried to show in 1883 (Papilio, 3, 36), it appears certain that our categories are quantitative. The quantity assigned to the Papilionidæ is here in all respects exceeded. Alone the shape of the wing, a "superficial" character, remains papilionid, but this is approached by some Parnassians and shared by other Lepidoptera. With regard to the name, it has been proposed by Felder to change it on account of its hybrid character. It seems to me safer to keep the original term proposed by Hope, the discoverer of the insect, since this course avoids all philological discussion, with which zoölogists are not primarily concerned and perhaps not always competent to enter upon. It seems likely also that in the future *all* rules limiting the action of the law of priority upon the published name will of themselves fall from lack of authority, and that preoccupation will remain the only bar to the use of the original title.

Teinopalpus imperialis.

Radius five-branched, generalized; iii_3 at or just beyond the point of juncture of cross-vein; iii_4 and iii_5 a long furcation. Vein iv_1 radial, nearing radius; cross-vein between iv_1 and iv_2 inwardly curved, degenerate. Vein iv_2 distinctly cubital, continuous. Submedian fold (vein vi) indicated, strongly so at base; between the fold and cubitus obliquely placed and faint traces of the vanished cubital cross-vein. On secondaries humeral cell narrow, elongate; the marginal veins subequally strong, the upper slightly thicker, a Parnassian character. Cell entire on secondaries, vein iv_2 cubital. Internal vein straight, continued to anal angle.

Contrary to what has seemed to me elsewhere the almost general rule, the primaries appear here, as also in the Parnassiidæ, more specialized than the secondaries. The falcate fore wings, the sharp outlines, while imparting to this butterfly an artificial look, remind one of the Charaxinæ. The movement of the media in disintegration is Parnassian, while the presence of vein ix on primaries decides at once its position as a member of the Papilionides.

Stated Meeting, February 3, 1899.

Vice-President SELLERS in the Chair.

Present, 19 members.

A letter was read from the President announcing the appointment of the Standing Committees for 1899, as follows:

Finance.—Messrs. Philip C. Garrett, William V. McKean and Joel Cook.

Publication.—Messrs. Daniel G. Brinton, Henry C. Baird, Patterson DuBois, I. Minis Hays and Joseph Willcox.

Hall.—Messrs. Horace Jayne, Joseph M. Wilson and Harold Goodwin.

Library.—Messrs. George F. Barker, T. Hewson Bache, Samuel P. Sadtler, Albert H. Smyth and Joseph G. Rosengarten.

To fill vacancy on Michaux Committee, Prof. Joseph T. Rothrock.

Announcement was made of the death of Mr. J. Blodgett Britton, at Warrenton, Va., January 19, 1899.

Vice-President Sellers then delivered the Annual Address, his subject being "Electrical Transmission of Energy."

Prof. Keiser made a communication "On a Liquid Acetylene Diodide," which was discussed by Dr. Sellers.

The Society was adjourned by the presiding officer.

Stated Meeting, February 17, 1899.

Vice-President Sellers in the Chair.

Present, 11 members.

Minutes of stated meeting held February 3 were read and approved.

The minutes of January 20 were amended to show that nominations 1488 and 1489 were then read for the first time.

Donations to the Library were announced.

A letter from Dr. Frazer was read, presenting the obituary notice of Prof. E. D. Cope, which was also read to the Society. Remarks on the same were made by Messrs. Sellers and Cleemann.

On motion of Dr. DaCosta, the thanks of the Society were voted to Dr. Frazer for the great care he has taken in the preparation of the obituary notice of Prof. Cope.

The Clerk of the Council reported that, no quorum being present on February 10, no business was transacted.

Dr. Hays offered a resolution that a Conversazione be given by the Society at a date to be subsequently fixed, and that a Special Committee of seven members be appointed by the President to arrange for the same. Carried.

The Society was adjourned by the presiding officer.

Stated Meeting, March 3, 1899.

Vice-President **Sellers** in the Chair.

Present, 15 members.

A letter was read from Dr. Cyrus Adler, on behalf of the American Committee of the Second International Conference on a Catalogue of Scientific Literature, requesting the Society to appoint a Committee to study the various questions relating to the Catalogue and to give its counsel on or before April 1, *proximo*. On motion, the President was authorized to appoint the Committee as requested, and he subsequently appointed Prof. Barker, Dr. T. H. Bache, Prof. Sadtler, Prof. Smyth, Mr. Rosengarten and Dr. Hays.

Prof. W. B. Scott presented for the *Transactions* a paper by the late Prof. Baur and Dr. Case, entitled "The History of the Pelycosauria, with a Description of the Genus Dimetrodon, Cope," which was discussed by Dr. Sellers and Messrs. Wistar and Morris, and was referred to the following special Committee: Prof. Scott, Dr. Jayne and Mr. Arthur E. Brown.

The Society was adjourned by the presiding officer.

Stated Meeting, March 17, 1899.

Vice-President Dr. **Sellers** in the Chair.

Present, 23 members.

Mr. Henry S. Pancoast, a newly elected member, was presented to the Chair, and took his seat.

Correspondence was submitted as follows:

From Hon. John Hay, accepting membership in the Society.

From the President, announcing the appointment of the following Committee on the Scheme of Classification proposed by the International Conference on Scientific Literature, to wit, the Library Committee and the Librarian.

From Vice-President Sellers, announcing the appointment of the following Committee on the paper of Prof. Baur and Dr. Case: Prof. Scott, Dr. Jayne and Mr. Arthur E. Brown.

The Librarian presented a list of donations to the Library.

The report of the Committee on Prof. Seeliger's paper was presented and accepted, and it was ordered that the decision of the Society thereon be reported to Prof. Meyers by the Secretaries.

Prof. George F. Barker made a communication on Hertzian waves.

Pending nominations Nos. 1477, 1478, 1480 to 1487, 1489 to 1495 and new nominations Nos. 1496 and 1497 were then read.

The Society was adjourned by the presiding officer.

Stated Meeting, April 7, 1899.

Vice-President WISTAR in the Chair.

Present, 5 members.

The minutes of the stated meeting of March 17 were read and approved.

An invitation of the Imperial Academy of Sciences of St. Petersburg to attend the fiftieth anniversary of the establishment of the Central Physical Observatory, on April 1–13, was read.

On motion of Dr. Hays, the Secretaries were requested to acknowledge receipt of the same and express regret that the time was too short to permit of sending a delegate to attend the anniversary.

The deaths of Prof. Othniel Charles Marsh, of New Haven, on March 18, in his sixty-eighth year; of Richard A. Tilghman, of Philadelphia, on March 24, in his seventy-fifth year, were announced.

On motion of Mr. Prime, Gen. I. J. Wistar was appointed to prepare an obituary notice of Mr. Tilghman.

A paper was read on "Specializations of the Lepidopterous Wing: The Parnassi-Papilionidæ, II," by A. Radcliffe Grote, A.M.

The Society was adjourned by the presiding officer.

SPECIALIZATIONS OF THE LEPIDOPTEROUS WING: THE PARNASSI-PAPILIONIDÆ.

II.

(Plates III, IV and V.)

BY A. RADCLIFFE GROTE, A.M.

(*Read April 7, 1899.*)

Fam. III. PAPILIONIDÆ.

The cubital cross-vein is always distinct, while in certain forms it does not connect inferiorly with vein vii, but is arrested at the submedian fold (vein vi). This latter is bent downwards to vein vii, beyond the cross-vein, in those types in which the cross-vein attains vein vii (see Comstock's figure in *Evolution and Taxonomy*, Plate ii, Fig. 2), and appears again within the cross-vein to base of wing. In certain forms the submedian fold is continuous from base to external margin, and the cross-vein then rests on this fold and does not reach vein vii (*e. g.*, *Eurycus cressida, Pathysa antiphates, Iphiclides podalirius*). The following table separates neurational groups, and, as far as possible, the genera. The hairy male pockets on the hind wing I have not specially examined. In the nomenclature of the veins I continue to follow Comstock.

1. Vein iii_3 of primaries out of iii_4 beyond the cell halfway to apex:

2. Cell of hind wings disproportionately reduced:

Hind wings greatly developed inferiorly, with long, pointed tail.............................(1st Group) *Leptocircus.*

1. Vein iii_3 of primaries arises from radius more or less exactly opposite to the point of junction of discal cross-vein:

2. Cell of hind wings subequal, narrowed outwardly by a downward curve of cross-vein between iii and iv_1:

3. Vein iii_1 of primaries anastomoses with ii:

Hind wings produced inferiorly, with short, sharp tail... (2d Group) *Idaides.*

Hind wings produced inferiorly, terminating bluntly, without tail.............................*Zetides.*

Hind wings not produced inferiorly, rounded, tailless... *Arisbe.*

Hind wings not produced inferiorly, with long, narrow, equal tail...............................*Pathysa.*

2. Cell of hind wings subequal, not narrowed outwardly (except in *Iphiclides*):

3. Vein iii_1 of primaries free to costa:

4. Internal vein of hind wings shorter, running out on internal margin before the longer excision at anal angle:

Hind wings tailless.............(3d Group) *Eurycus.*

Hind wings tailed....................*Pachlioptera.*

4. Internal vein of hind wings longer, attaining the internal margin before the shorter excision at anal angle: (4th Group)

[*Papilio, Iphiclides, Jasoniades, Euphoeades, Heraclides, Laertias, Menelaides, Achillides, Orpheides, Nestorides, Calaides, Priamedes, Parides, Ithobalus, Iliades, Troilides,* with the types given by Scudder, I am unable to separate by adequate neurational or wing characters in a table. They all generally agree, most of them exactly except by relative characters so obscure as to be of hardly more than specific value.]

1. Vein iii_3 arises from radius above the cell and just before the junction of the cross-vein.......(5th Group) *Trogonoptera.*

1. Vein iii_3 arises from radius above the cell and well before the point of junction of discal cross-vein:

4. Internal vein of hind wings reaching to anal angle, internal margin full and rounded...............
(6th Group) *Ornithoptera.*

From the foregoing table we may extract the following neurational diagnoses of the principal genera in the different groups:

(1st Group.)

Gen. *Leptocircus* Swainson, 1832.

Type: L. curius.

= *Lamproptera* Gray, 1832 (preoccupied).

Vein iii_3 of primaries arises out of iii_4 beyond the cell halfway to apex of wing. Cell of hind wings disproportionately small and reduced. Hind wings greatly developed inferiorly, with long, pointed tail. On primaries the cubital cross-vein does not attain vein vii, but is arrested at submedian fold (vein vi). Vein "ix" of primaries present, as everywhere in the Papilionides.

The neuration of primaries, owing to the advanced position of vein iii_3, presents very striking analogies with the Sphingidæ, but a relationship with this group is absolutely excluded by the presence of vein "ix" and absence of viii on fore wings. An habitual resemblance to *Goniloba* and other Hesperian genera is offered by the coloration; this is perfectly contradicted by the neuration which is Papilionid. How great must be the phyletic value of vein "ix," if it persist in this isolated and aberrant form! In none of the generic types examined by me do I find any probable indications of the more immediate phylogeny of *Leptocircus.*

(2d Group.)

Gen. *Idaides* Hübner, 1816.

Type: I. codrus.

Vein iii_3 of primaries arises from the radius more or less exactly opposite the point of junction of the discal cross-vein. The discal cell of secondaries is subequal, but is narrowed outwardly by a downward curve of the cross-vein, between radius (iii) and first branch of media (iv_1). Vein iii_1 of primaries, the first radial branch, anastomoses with vein ii. The cubital cross-vein is degenerate, narrow, and does not reach vein vii. The hind wings are produced inferiorly, and vein iv_3 terminates in a short and sharp tail.

This term has priority for a well-defined group characterized by the junction of the first radial branch with the subcosta. It is also marked by the downward scoop of the cross-vein between veins iii and iv_1 on hind wings. The genera *Idaides* and *Zetides* are closely allied, and appear merely to differ by the details of specialization of the outer margin of secondaries. *Arisbe* stands further apart by the rounded, not produced, hinder margin of secondaries. It possibly represents an older form of the group. *Pathysa* differs by the frail, testaceous veins, as well as by the tailing of the normally proportioned hind wings. In all of these characters, as well as in the striped ornamentation, it recalls *Iphiclides*, belonging to a different group having vein iii_1 free to costa. A further character, and one which suggests that *Iphiclides* presents an intermediary type, is that this latter genus has also the cross-vein of secondaries downwardly curved, between radius and first branch of media on hind wings. The intersection of the radial branches with the subcosta, which characterizes this group, is paralleled in the Charaxinæ. Nevertheless, I think we cannot regard this common feature as indicating more than an analogy between the Nymphalids and Swallowtails.

(3d Group.)

Gen. *Eurycus* Boisduval, 1836.

Type: E. cressida.

Vein iii_3 of primaries arises from the radius at a point more or less exactly opposite that of the junction of the discal cross-vein. The discal cells are subequal on both wings. Vein iii_1 of primaries free to costa. Internal vein of hind wings shorter, running out on internal margin before the long excision at anal angle. On primaries the cubital cross-vein expires just before vein vii. Humeral cell of secondaries large, subquadrate. Hind wings subovate, without tail.

This group is interpolated in this place on account of the extreme specialization of internal margin of secondaries and the shortening of vein vii. Thus the same tendency is manifested here as in the Parnassiidæ, to hollow out the margin and shorten the anal vein of the hind wings. The group is probably a lateral specialized branch from early forms of the succeeding and more typical group of the family. The genus *Pachlioptera* Reakirt, 1864, with the type *aristolochiæ*, differs very slightly. I regret not to have been able to examine *Blakeia gundlachianus* (columbus, grotei).

(4th Group.)

Gen. *Pupilio* Linné, 1758.

Type: P. machaon.

Vein iii$_3$ arises out of radius more or less exactly opposite to the point of junction with discal cross-vein. Cells subequal. Vein iii$_1$ of primaries free to costa. Internal vein of hind wings inwardly curved, attaining the margin just before the short excision at anal angle. Cubital cross-vein joins with vein vii.

Except *podalirius*, the types of the genera arranged under this rubric agree in main features, while differing in small details which it is optional to consider as of generic value. In *machaon* the humeral cell of hind wings is small and narrow. The præcostal spur has a lateral extension. There is a moderate, narrow tail, not spatulate.

(5th Group.)

Gen. *Trogonoptera* Ripp., 1890.

Type: T. brookeana.

Vein iii$_3$ arises just before the point of junction of cross-vein with radius. Cubital cross-vein not attaining vein vii. Fore wings long and narrow, pointed, entire. Hind wings reduced, rounded, tailless. Internal margin full, the vein straight, continuous. From the characters of the radius this genus is nearer to *Papilio* than to *Ornithoptera*. It is remarkable how persistent the neurational features are in the group of *Papilio*, and especially that vein iii$_3$ is so immovable in its position nearly exactly opposite the cross-vein. It must be therefore considered an important feature that this vein arises much beyond the cross-vein in *Leptocircus*, and before it in *Ornithoptera*. In *Trogonoptera brookeana* it has not quite attained the Papilionid position, but it has decidedly abandoned that of *Ornithoptera*. The structure of the hind wings resembles that of the latter genus.

(6th Group.)

Gen. *Ornithoptera* Boisduval, 1832.

Type: O. priamus.

Vein iii$_3$ arises out of radius above cell and well before the point of junction of cross-vein. Discal cells subequal. Vein iii$_1$ free to costa. Internal vein of hind wings reaching anal angle; no anal excision.

The comparative characters are those of generalization, so that *Ornithoptera* presents features which the rest of the Papilionides have probably abandoned. In the same way I assume that the species of *Eurymus* (*Colias* Auct.) have passed through a *Megan-ostoma* stage, and the entire extant Pieridæ an *Anthocharis* stage, in which latter the Radius was five-branched and generalized. There is a strangeness about *Ornithoptera*, suggesting a separate origin. This disappears with the higher forms of the Papilionides, which have come to look much like other butterflies. The remaining generic types may be now gone over in review. As far as possible I take the generic titles in their chronological order.

(2d Group.)

Zetides sarpedon.

Agrees with *Idaides*, except that the secondaries are bluntly produced inferiorly and are without a tail. Vein iv_2 lies somewhat nearer iv_3 at base. In both genera the excision at anal angle is long, owing to the produced wing, but vein vii is not relatively shorter, as in *Eurycus* (3d Group). *Zetides* appears more specialized than *Idaides*. The differences are small, but may be considered as of generic importance.

Arisbe similis.

Agrees with *Idaides*, except that the secondaries are not produced inferiorly; the outer margin is rounded, without salient projection. The anal excision is shorter. The position of iv_2 on secondaries is more central, and this appears a more generalized form than either *Idaides* or *Zetides*.

I am indebted to the kindness of Dr. Karl Jordan for material of this species. Notwithstanding the differences in shape of hind wings, these three genera are undoubtedly phylogenetically nearly related. The veins are opaque and strong.

Pathysa antiphates.

Agrees in one essential neurational feature, the fusion of the first radial branch, with the preceding genera, to which, notwithstanding "superficial" discrepancies, it may thus be distantly related. The cubital cross-vein is attenuate, and does not reach vein vii. On the secondaries the position of iv_2 is nearly central. Vein iv_3 is produced into a long tail, not spatulate. In shape of wing this genus resembles *Iphiclides*, as also in the slender, transparent veins, and in the striped character of the ornamentation. It probably occupies an independent intermediate position. The colors in this group, brown and greenish yellow, are peculiar, and, in preparing the wings in the usual manner, they are persistent. *Pathysa* has striped wings. In *Arisbe* the bands are indicated by scattered blotches. These latter are gathered into a single series of interspaceal spots in *Idaides*, on the primaries. These spots coalesce and broaden into a band, which also obtains over the hind wings, in *Zetides*.

The coincident characters of *Pathysa* and *Iphiclides* allow of no other conclusion than that the two are somewhat nearly phylogenetically connected, notwithstanding the fact that in *Pathysa* the first branch of radius joins subcosta, while in *Iphiclides* it is free. Assuming that the Second Group contains younger forms, we might have in *Iphiclides* a type representing a stage through which *Pathysa* has already passed. But *Iphiclides* and the members of the Second Group are in one character more generalized than *Papilio* and its immediate allies, *i.e.*, the straight internal vein of hind wings. We have probably to do with divergencies from a common stock in different directions, in part retaining characters of generalization. It is sufficient here that we show that *Iphiclides* and *Papilio* constitute totally distinct genera, having probably a different immediate ancestry. And it remains a possibility that the fusion of the first radial branch with subcosta is a more recent feature, here engrafted upon a wing in other characters representing an older type than *Papilio*. Thus the *Idaides* group may be a lateral branch, thrown off before the tendency of the internal vein to curve and shorten on hind wings was developed. And to this branch, as represented by *Pathysa*, *Iphiclides podalirius* and allies may be related. In respect of the curved inner margin of the hind wings, *Papilio machaon* and allies are more specialized than *Iphiclides*.

(3d Group.)

Pachlioptera aristolochiæ.

The shape and neuration of primaries agree exactly with *Eurycus*, except that the cubital cross-vein, while narrowing inferiorly, appears to reach vein vii, forcing the submedian fold down to the vein. On secondaries the humeral cell is smaller and vein iv_3 terminates in a spatulate tail. Veins iv_2 and iv_3 are not so near at base as in *Eurycus*, than which this form appears more generalized. I do not doubt the validity of the genus.

(4th Group.)

Iphiclides podalirius.

Compared with *Papilio machaon* the veins are more slender and transparent. Veins iv_2 and iv_3 on secondaries are nearer together at base. The internal nervure is straight and the margin fuller on hind wings. On primaries the cubital cross-vein is slighter and does not attain vein vii. The discal cross-vein is downwardly curved on hind wings between iii and iv_1. The humeral cell is larger than in *Papilio*.

By the free first radial branch this genus agrees with *Papilio* and the other genera of the group. Otherwise it is more nearly connected with *Pathysa antiphates*, and its generic distinction as compared with *Papilio* is beyond question. The straight internal vein of secondaries is a character of generalization as compared with *Papilio*.

Jasoniades turnus.

Agrees very closely with *Papilio*. The humeral cell is larger, the tail shorter and a little spatulate. The internal vein is curved, as in *Papilio*, with which it so closely corresponds as to make the propriety of its generic separation doubtful. The two forms appear to belong to the same immediate phylogenetic line.

Euphœades troilus.

The tail is a little shorter and spatulate; otherwise this form agrees so exactly with *Jasoniades* that I find no distinguishing character whatever. Belongs to the same branch and group.

Heraclides thoas.

The tail is a little longer than in *Jasoniades* and spatulate. Vein iv_2 on secondaries is a little farther from iv_3, so that *Heraclides* is more generalized. Otherwise I find no differences whatever. From *Euphœades* I find only the slightly longer tail to distinguish it.

The separation of the preceding forms, except *Iphiclides*, from each other and from *Papilio* seems difficult from the neuration. All have the internal vein of secondaries curved and are evidently very nearly related, belonging to the same phyletic branch of the family.

Laertias philenor.

Agrees with *Papilio* and preceding genera, except that the internal vein of secondaries is straighter and the margin fuller. I think this feature important. The tail is shorter and hardly spatulate. While otherwise resembling *Jasoniades*, the relative position of iv_2 is a little more removed from iv_3 at base. Appears a slightly more generalized type than any of the foregoing, and to represent a stage from which it is probable the preceding (except *Iphiclides*) have emerged.

Menalaides polytes.

Differs from *Laertias* only in that the tail is shorter and broader, somewhat spatulate.

Achillides paris.

Agrees with *Laertias* and *Menalaides*, except that the humeral cell narrows a little more outwardly. The tail is a little longer than in *Menalaides*, from which I cannot otherwise satisfactorily separate it. These three "genera" appear to be related by the straighter vein vii of secondaries.

Orpheides demoleus.

Appears nearest related to *Jasoniades*. It only differs by the absence of a tail, and in that the præcostal spur is continued, in an even curve, quite to the shoulder of the wing. The internal vein of hind wings is bent as in *Jasoniades* and allies, with which it should be apparently associated.

Nestorides gambrisius.

Not distinguishable structurally from *Orpheides demoleus*. The præcostal spur is equally continuous, and, although the proportions of the humeral cell are very slightly different, I am of opinion that no sufficient generic characters can be supplied by the neuration.

Calaides androgeus.

Agrees well with the preceding, but differs by the median and cubital branches of the hind wings forming sharp projections, of which that to iv_3 is, as usual, the longest. On primaries vein iii_3 yields very slightly to the tendency to be outwardly removed, and arises beyond the exact point of junction of cross-vein.

The following three generic types stand rather apart and by themselves. There is, except the straighter anal vein, nothing in the neuration to contradict main features in the definition of *Papilio.* They appear, on the whole, to be somewhat generalized forms, from the usually straight internal vein of hind wings.

Priamides pompeius.

Primaries rounded at tips; outer margin even, medially hollowed out, so that the wing may be described as subfalcate. Cubital cross-vein continuous to vii. Secondaries with præcostal spur continued to the margin, humeral cell moderate, internal vein somewhat bent, no tail, outer margin regularly scalloped.

Ithobalus polydamus.

Agrees with *Priamides* in shape of primaries, outer margin a little scalloped. Secondaries with internal vein straight, outer margin as in *Priamides.* Præcostal vein shorter, not reaching margin.

Parides echelus.

Primaries pointed, with sharp tips; external margin even, nearly straight. Hind wings with the outer margin produced between iv_2 and v_2, scalloped, without prominent tail. Internal vein straight, or even a little bulging. Vein iii_3 arises a little beyond cross-vein, and herein is this form specialized.

The following type seems related to those immediately preceding:

Iliades memnon.

The fore wings are intermediate in shape between *Priamedes* and *Parides;* the apices are blunt, while the outer margin is nearly straight. The tailless hind wings have the outer margin very slightly scalloped. The venation generally agrees; the internal vein of secondaries is straight.

I have been unable to obtain material of the butterfly "*Troides helena* L.," which Scudder gives as the type of Hübner's genus *Troides,* Verz. 88, a generic name which has then apparently been wrongly used for the type *Ornithoptera priamus* L. Specimens of "*Papilio helenus,*" received from Dr. Staudinger and examined by me, do not differ from *Menelaides polytes* in venation; the "tail" is merely a little longer.

The last type I have been able to examine is:

Troilides torquatus.

The neuration agrees in every detail with that of *Heraclides* *thoas*, so that I cannot distinguish the two in any way, and I must suppose this generic title to be invalid.

In all these generic types of the *Papilio* group the third radial branch arises just opposite the point of junction of the discal cross-vein, with a tendency to remove beyond it. The progress of this branch along the radius, outwardly, may be apparently taken as an index of the specialization. In the Papilionides there is a general correspondence between the movement of this vein and the specializations of the abdominal field of the secondaries. The bending of the internal vein of hind wings is secondary in its nature, has been probably attained along divergent lines, and is a separate and well-marked feature in the specializations of the wings of the Papilionides.

The question as to the value of generic characters becomes simplified when we reflect that there is no criterion, save that of quantity, by which we can divide them from specific characters. For practical purposes it is well to break up such extensive genera as *Papilio*, and to do so we must take slighter variations as the basis of the division. It may be remembered that none of our categories could apparently exist except for "missing links," and our species thus appear as the momentary results of an average of arrested development, with wider or narrower breaks between them. This is one of the irrelevant generalities which it is well to bear in mind, in order to avoid insisting too categorically upon the absolute value of our divisions and terms.

The generic types above discussed appear to group as follows:

Iphiclides.	Papilio.	Lærtias.	Priamides.
	Jasoniades.	Menalaides.	Ithobalus.
	Euphœades.	Achillides.	Parides.
	Calaides.		Iliades.
	Heraclides.		
	= *Troilides*.		
	Orpheides.		
	Nestorides.		

Systematic Position of the Papilionides.

The argument as to the rank and position in the system of the Papilionides may be recapitulated here: All the generic types in the Parnassi-Papilionidæ that I have been able to examine have vein "ix" of primaries well developed. This vein arises at base next to vii, runs outwardly and downwardly, in a more or less strongly given curve, to internal margin. I am inclined to regard this vein "ix" as the remnant of a longitudinal vein which has become shortened, in the same way as vii becomes shortened and bent on the hind wings of the Papilionides, and of which latter the stages between the long, straight vein and the shorter curved vein are extant. This vein "ix" is opposed in position to vein viii of the Hesperiades, which appears as a slender fork to vein vii at base and is more or less distinct in the Pieridæ, Limnadidæ, Heliconiidæ, Libytheidæ, Nemeobiidæ, Riodinidæ, Lycænidæ and Hesperiadæ. I have found traces of it in *Argynnis* and *Vanessa* among the Nymphalidæ proper, but no indication of it in the Agapetidæ. Where it is wanting in otherwise related forms I adopt the view that it has faded out. It has faded out, then, in *Morpho*, while the cubital cross-vein is persistent.

While vein "ix" appears to be a character of a primary nature, the hind wings of the Papilionides display two other features, which, since they recur in other butterflies or moths, may be considered as characters of convergence. These are the humeral cell and the single internal vein. The three neurational features of the Papilionides together are wanting in all other butterflies, but the single internal vein appears again in the Saturniades, the humeral cell in the Limnadidæ and Bombycides, while nowhere throughout the higher Lepidoptera, so far as I yet know, is the primary character of vein "ix" repeated. The ancestry of the Papilionides is not yet made out by the discovery of surviving forms.

It is impossible to leave the Papilionides in a classificatory position between the Blues and the Skippers, because such a position violates the integrity of the Lycænid-Hesperian branch. The diurnals, as a whole, are susceptible of a tripartite division upon the neurational characteristics. These three divisions are, severally: the Parnassi-Papilionidæ, the Pieri-Nymphalidæ, and the Lycæni-Hesperiadæ. The first of these is isolated by the presence of vein "ix," the last two have a common bond in the presence of vein viii of the fore wings. Therefore the value of the divisions is unequal, and the first outweighs either of the two latter. If the Hesperiades are, then, to be forced at any point to admit the Papilionides, that point might be selected between the Pieri-Nymphaïid and Lycæni-Hesperid groups. But the principal defense for such an interpolation would be the common survival of the cubital cross-vein, which the Parnassians have lost. This is distinct in the Papilionidæ, and more or less so in the Nymphalid group, in the Limnadidæ, Heliconiidæ and Morphidæ, these latter appearing to be otherwise specialized Satyrids. Thus this survival is shown in groups primarily differing in the presence of "ix" or viii on fore wings. I conclude, then, it is here an independent survival in unrelated groups. Nothing can show more clearly the overstress that has been laid upon the generalized features of the Papilionid wing than the demonstration that this residual character is shared also by the brush-footed butterflies, with which Mr. Scudder would head the sequence of the diurnals. There appears to be nothing in the neuration to contradict the monophyllism of the brush-footed butterflies, unless we are prepared to assume that the Agapetidæ and Morphidæ have parted with vein "ix" and not with viii.

The forked anal vein (viii) of primaries is absent in the Satyrids, and this feature seems, outside of the sexual character of the swollen veins (traces of which I meet in certain of the Nymphalidæ proper) and the generalized radius, to distinguish these from the Pierids. But the character is repeated in other groups of the brush-footed butterflies, and it seems impossible to find positive neurational characters upon which the Pieri-Nymphalidæ might be divided. And only the general pattern or plan of the veining—*i. e.*, the more parallel neuration and equal spacing, the retention of the middle median branch in position, an indisposition in the veins to approach and furcate—distinguishes the wings of the Lycæni-Hesperiadæ from those of the Pieri-Nymphalidæ. The Blues show a radial specialization on a wing which is fundamentally Hesperian. This points to the fact that the Lycænidæ and Hesperiadæ are members of a common phylogenetic branch, however remote the point of divergence may lie. I assume that this branch joins the main stem of the Pieri-Nymphalid butterflies, because in the Charaxinæ I find an approach to the separated longitudinal veins of the Hesperiadæ, while vein viii of fore wings of the Whites and brush-footed butterflies is repeated in the Lycæni-Hesperid group. Whether future studies in ontogeny render a presumed connection of the Papilionides with the Nymphalids entertainable or not, we are equally warranted, from the opposed directions of the last anal vein of primaries, in classifying the diurnals as either Papilionides or Hesperiades.

EXPLANATION OF PLATE III.

The figures are obtained by an improved photographic process. The veins are numbered according to the system Redtenbacher-Comstock: iii = radius, iv = media, v = cubitus. Vein "ix" of primaries, a principal character of the Papilionides, is numbered in red. The figures are of the natural size.

FIG. 1. *Parnassius apollo.*—Type of genus and family. The specialized form of the Papilionides, as shown by the following characters: On fore wings the first median branch (iv_1) has left cross-vein and arises from radius; the radius itself is four, instead of being five-branched; the cubital cross-vein has disappeared; on hind wings the lower margin of humeral cell has faded out superiorly, the internal margin is hollowed out, and vein vii is greatly shortened. *Doritis mnemosyne* does not differ generically from this type. *Hypermnestra helios* agrees by the four-branched, specialized radius, and I limit the subfamily to these two genera, since here the demarcation is abrupt, not, as in the Pierinæ, undefined.

FIG. 2. *Archon apollinus.*—Type of genus and belonging to the subfamily Zerynthianæ, of which it is the specialized form. Radius five-branched, generalized. The first median branch springs from cross-vein; lower margin of humeral cell complete; vein vii longer, as compared with *Parnassius.* The ornamental bands have not been broken up into the spots of *Parnassius.* The white color of the Parnassians and Pierids has been developed independently and is here a general character of convergence. *Archon* is seen to be a generalized form when compared with *Parnassius.*

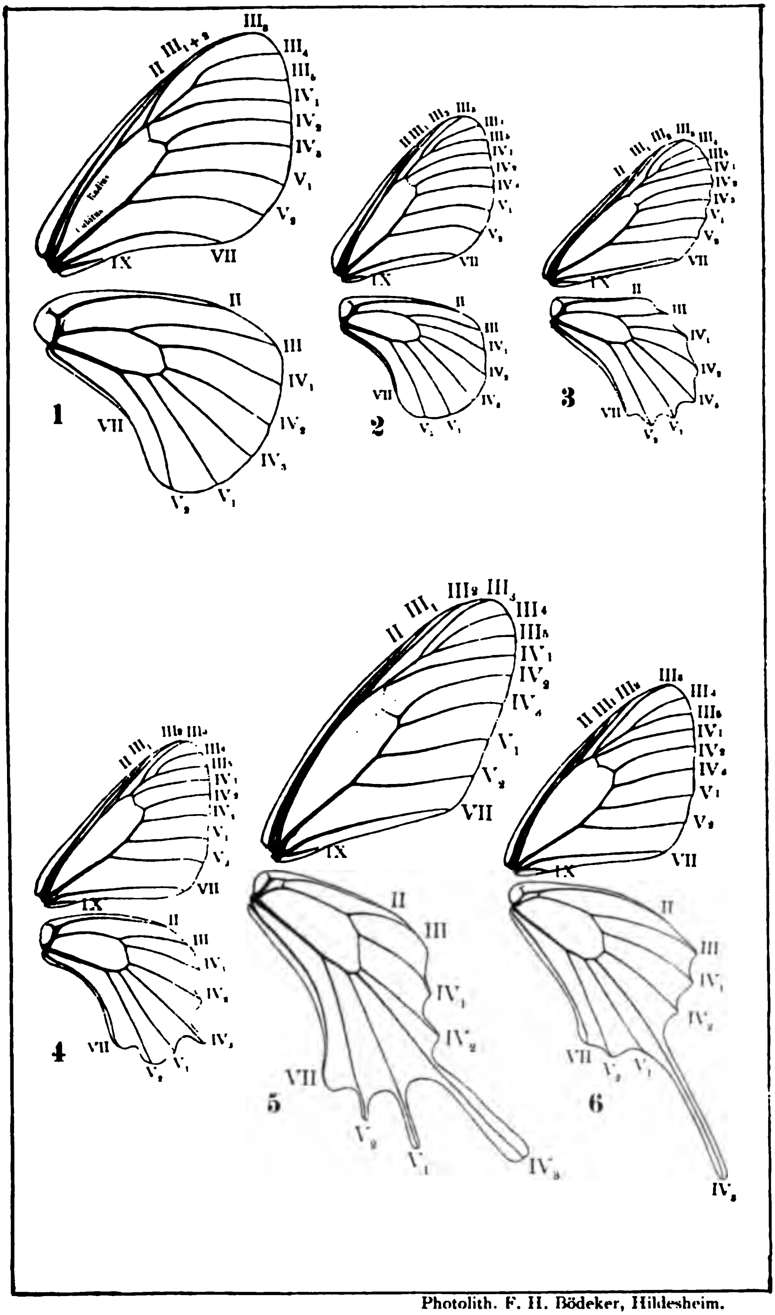
FIG. 3. *Zerynthia polyxena.*—Type of genus and subfamily. Radius five-branched. In this species and its varieties vein iv_1, the first median branch, is in a fluid state, sometimes issuing from cross-vein, sometimes ascending radius. Compare figure of *Zerynthia rumina*, Schm. von Hildesheim, Taf. i, Fig. 2. Vein vii of hind wings is but little shortened.

FIG. 4. *Luehdorfia puziloi.*—Type of genus. Agrees well with *Zerynthia.* In both this and *Armandia* the cubitus shows a very inconspicuous scar, a relic of the vanished cubital cross-vein. The gradual disappearance of this cross-vein, from the Papilionidæ to the Parnassiidæ, demonstrates the greater specialization of the latter. Compare text.

FIG. 5. *Armandia thaitina.*—Belongs to Zerynthianæ. Type of genus. Radius five-branched; iv_1 from upper corner of cell. A beautiful and interesting form, owing to the papilionid shape of wings.

FIG. 6. *Sericinus telamon* ♀.—Type of genus. Radius five-branched. First median branch (iv_1) from cross-vein, and herein more generalized than *Armandia.* Vein vii of hind wings hardly shortened. Compare these Parnassian types with the ensuing Papilionidæ. Note the equal presence of vein "ix" of primary wings and the survival of but one anal vein (vii) on hind wings, and that the two types mainly differ in the breaking up of the median system in the Parnassians. It seems probable that, in extinct types of Papilionides, the vein "ix" was lengthened and sought the anal angle of the primary wing.

PROCEEDINGS AM. PHIL. SOC. VOL. XXXVIII, NO. 159, PLATE III.



Photolith. F. H. Bödeker, Hildesheim.

A. Radcliffe Grote — Wings of Butterflies.

I conclude, then, that no sufficient reason can be shown for interrupting the sequence of what has been called the Macrolepidoptera, which all alike possess vein viii, and that for a group of butterflies having, on the contrary, vein "ix," the proper place in the system is by themselves at the commencement of the series. It must be recollected that our phylogenies are largely suppositional, and that, practically, whatever their origin, the diurnals should be kept together in collections and catalogues. No gain in scientific accuracy is attained in discarding the general lines of the Fabrician sequence of 1787. The correspondences of the Papilionides do not lie with the Hesperiadæ, as urged by Mr. Scudder, but with the Pieri-Nymphalidæ: the suspension of the chrysalis with the Pierids, the neurational analogies with the Nymphalids. If these are acknowledged as affinities, not as analogies, then there is also no sufficient reason for changing what is practically the best sequence and which has the advantage of being long accepted. It is an innovation to place the Papilionides between the Blues and the Skippers, and one which I show to be destitute of reason, from the neuration as well as from a weighing of the value of other features which appear on the surface to justify such a conclusion (see my papers in *Natural Science* for January and February, '98). It must, then, appear to me that no greater mistake has as yet been made in classifying the butterflies than that which associates the Swallowtails with the Skippers. And this is the main part of my argument, that whatever relationship may be made out for the Papilionides with the other butterflies, the connection of the Blues and the Skippers should not be disturbed by the Swallowtails being thrust in between them.

An unwarranted use of the terms "superficial" and "structural" has been repeatedly made in lepidopterological writings, sometimes for the mere purpose of invidious comparison. The assumed antithesis, as between classes of external characters, is entirely illusory. Uncritical studies of the shape of the genital pieces, as of any other of the appendages, lead to common and unsatisfactory results. I conclude that a phylogenetic classification cannot be reached until primary and secondary features are distinguished and the characters indicating relationship separated from those of convergence.

The neurational characters of convergence which appear in certain Papilionides, and again in groups of the Nymphalids, may be summed up as follows: The first radial branch may intersect with subcosta (*Idaides* and *Anæa*); the cubital cross-vein or its traces occurs in both series (in the Nymphalids in *Limnas*, *Heliconius*, *Morpho*), while traces of the humeral cell of secondaries of the Papilionides are found in the Limnadidæ and Heliconiidæ. It is remarkable that just in these two latter families the resemblance is contradicted by the fact that both display the forked vein viii, in contradistinction to the downwardly curved vein "ix" of the Papilionides. It is this fact that allows me to consider the characters of resemblance as residual and common to the lepidopterous wing, and as undecisive of questions of a nearer relationship. These characters, the traces of the cubital cross-vein, etc., allow of the view that the Limnadidæ and Heliconiidæ retain primitive features and may more nearly represent early stages of the Nymphalids proper. Genera like *Dione* may supply a connection between the Heliconians and *Argynninæ* and render the view probable that the brush-footed butterflies are monophyletic.

Variability in the Veining.

I have shown (*Trans. Ent. Soc. Lond.* 1897, 342) that the variations in the neuration within the limits of a species take the same direction with those used to define distinct species or genera. In other words, they follow the chief directions which underlie most changes in the neuration. These latter lie in the breaking up of the median series and the suppression of the radial branches. For instance, in the five-branched forms of the Anthocharini there will be found a tendency to discard one vein in the direction of the four-branched forms of *Tetracharis*. In a variable species standing between *Euchlæ* and *Tetracharis* the disappearing vein may be discarded by anticipation (specialization) or retained by reversion (generalization). In *Pontia* we have the three-branched form definitely assumed, and we may consider that the ancestry of *P. daplidice* has passed through the *Euchlæ* and *Tetracharis* stages. In the same way the passage of *Mancipium* to a three-branched form is in process of accomplishment; sufficient material has not yet been examined of *brassicæ* to determine whether the short apical veinlet is discarded or not in the majority of individuals. In the *Zerynthianæ* we find individual variation in the direction of the breaking up of the median series; sometimes vein iv_1 ascends the radius; again, in generalized individuals, it retains its older position on the cross-vein. It is a mistaken view to consider these variations "abnormal." They have a definite end and object, and show us how the changes in the venation have been slowly attained. All the species we take cognizance of are seemingly in a certain stage of progression, which temporarily assumes an apparent greater or lesser stability as the insect and its environment are equalized. In *Crinopteryx familiella* Spuler considers that we have a now variable form in the final stages of discarding the many-branched radius of the secondaries, thus showing us how the wing of *Eriocephalus* may have passed into that of the aculeate *Tineidæ.*

Conclusion.

I have taken the present opportunity to review my publications upon the neuration of the diurnals, to compare the figures again with the photographs and preparations. After supplying the missing details in the figures of *Parnassius apollo* (in which the lower incomplete margin of the humeral cell was omitted) and of *Heliconius antiochus* (in which the traces of the cubital cross-vein and internal vein were left out), I find nothing to add or alter. The method employed by me prevents errors of commission, but, owing to defects in the preparations, overlooked at the time, it has happened that the above details were not reproduced on the stone.

My studies were entered upon with the view of bringing our classifications into a nearer correspondence with a probable phylogeny. It was unexpected that the result was to confirm the general sequence of Linné and Fabricius, no less than that of the modern authors, Wallace, W. H. Edwards, the Catalogue of Staudinger, at least so far that we may commence with the Papilionides. Since the Parnassians belong beyond question to this stem, and are more specialized than the Swallowtails proper, we should begin with this family. I may reply to comparisons that have been made, that no results obtained in this way, as between ultimate specializations of the same organ in different groups of butterflies, can affect the phylogeny brought out by me. For this latter rests on the primary character offered by vein "ix," and not upon coincidences in ultimate structure, which are not exclusive, and may well have been independently reproduced upon separate phylogenetic lines. These are characters of convergence, and are not properly used as an index to relationship.

A review of the general neuration shows that the hesperid wing is the simplest existent form with the veins all separate. A movement in specialization of the radial branches, normal with the lepidoptera, changes this wing into that of the lycænids. Both are now specialized and hardened types, and the position of the median branches has become so fixed that, in their specialization, the middle branch will not yield and submits to extirpation *in situ*. The condition of the hesperid wing is nearly reproduced in *Charaxes*, and proves that this was the original condition also of the Pieri-Nymphalid branch. It has been abandoned in specialization through the process of absorption and furcation of the veins; thus the hesperid type of wing becomes the unit underlying all the wing types of the Hesperiades. Into this group, so closed, and having the internal vein (vii) forked at base (viii), we can nowhere properly interpolate a group possessing an additional vein ("ix") and having no fork (viii) to the internal vein (vii), although, as a matter of theory, we may contend that the papilionid wing had also primarily separated veins.

I conceive, then, the Hesperiades to be monophyletic, a development of a single branch or stem of the lepidopterous tree, and as being independent of the Papilionides and their ancestry. As compared to the Papilionides, the rest of the butterflies are in the position of the Noctuid branch when compared with the Saturniades. This parallel is not a little exact. The development in evolutionary changes of the Papilionid wing is closely copied by the Saturniadæ, which have but one anal vein on hind wings. We have the same hollowing out of the inner margin in both groups among specialized forms. The Hesperiades resemble generalized moths in having two or more internal veins, and although these are convergent characters, not of phyletic value, they sustain the parallel. The exclusiveness of the Papilionides is supported by vein "ix" of primaries. When we take into account their total wing-structure, the idea that we have to do with a radically different development of the lepidopterous type becomes more and more reasonable. I separate, therefore, not the Hesperiadæ, but the Papilionides from the rest of the butterflies, and herein I differ from other authors, no less than from Comstock.

The general inequalities of all the specializations preclude, to a great extent, the question of rank, which practically becomes a matter of more limited importance within the confines of a single group. And I may repeat here, that the specializations of the larvæ are neither homologous nor dependent upon the specializations of the imago. The external influences by which the different stages are surrounded are radically diverse. It is demonstrable that in *Apatela* the larvæ are more specialized, as larvæ, than are the moths, as moths. These latter are simple Agrotids, or Hadenids. The larvæ rank with the Arctians in specialization. Generic differences between imagos are not necessarily shown *also*, but may be displayed independently in the earlier stages of the insect. A specialized chrysalis may be attained by a form which, in the imago state, lags behind its fellows. I ventured first to give this view of the independence in specialization of the stages as early as 1876. Mr. Butler's paper on *Apatela* remains, at least, an exquisite satire on a generic classification from larval characters alone.

However, I seem to differ from Mr. Scudder (*Hist. Sketch*, 103), who holds that generic distinctions are as easily traced in the larva as in the imago, thus assuming a parity in specialization. Nevertheless, in the case of the forms of *Agrotis* Led., we may have moths which offer characters upon which generic distinctions have been founded, while the larvæ are so much alike that no such characters appear with them. And again we find species of *Apatela*, feebly differentiated in the imago state, proceeding from strongly diverging larvæ. The whole group of Acronyctid genera is held together by specializations of the larva alone. No intimate characters hold *Panthea* and *Apatela* united as moths, and here it seems possible that the larval specializations common to both are nonphyletic, convergent, they have been acquired along different routes, and thus the basis of the family Apatelidæ would be artificial. Where no such contradiction is offered the development may be assumed as monophyletic, the classification as natural. This view does not militate against the validity of Dyar's general classification as based on the larval tubercles in position. This character, as pointed out by me in '97, is valuable from its indifference to external influences.

In the case of the Papilionides there appears to be the alternative that either vein "ix" has developed subsequently to the disappearance of viii or before its appearance. If we accept the latter, then the Papilionides have branched off, as Prof. Comstock says, long before butterflies assumed their present form (*Evolution and Taxonomy*, 112). In this case all traces of an immediate ancestry have, however, vanished. No concession to this fact is made by placing the Papilionides, as Prof. Comstock does, between the Blues and Skippers, clearly, even if distantly, related groups, offering at least no such contradictory characters as do the Swallowtails. Prof. Comstock in his able treatise, to which I am much indebted, does not entertain the view that the Papilionides may *not* have branched off from the immediate stem of the other butterflies, nor does he apparently insist upon the morphological value of vein "ix."

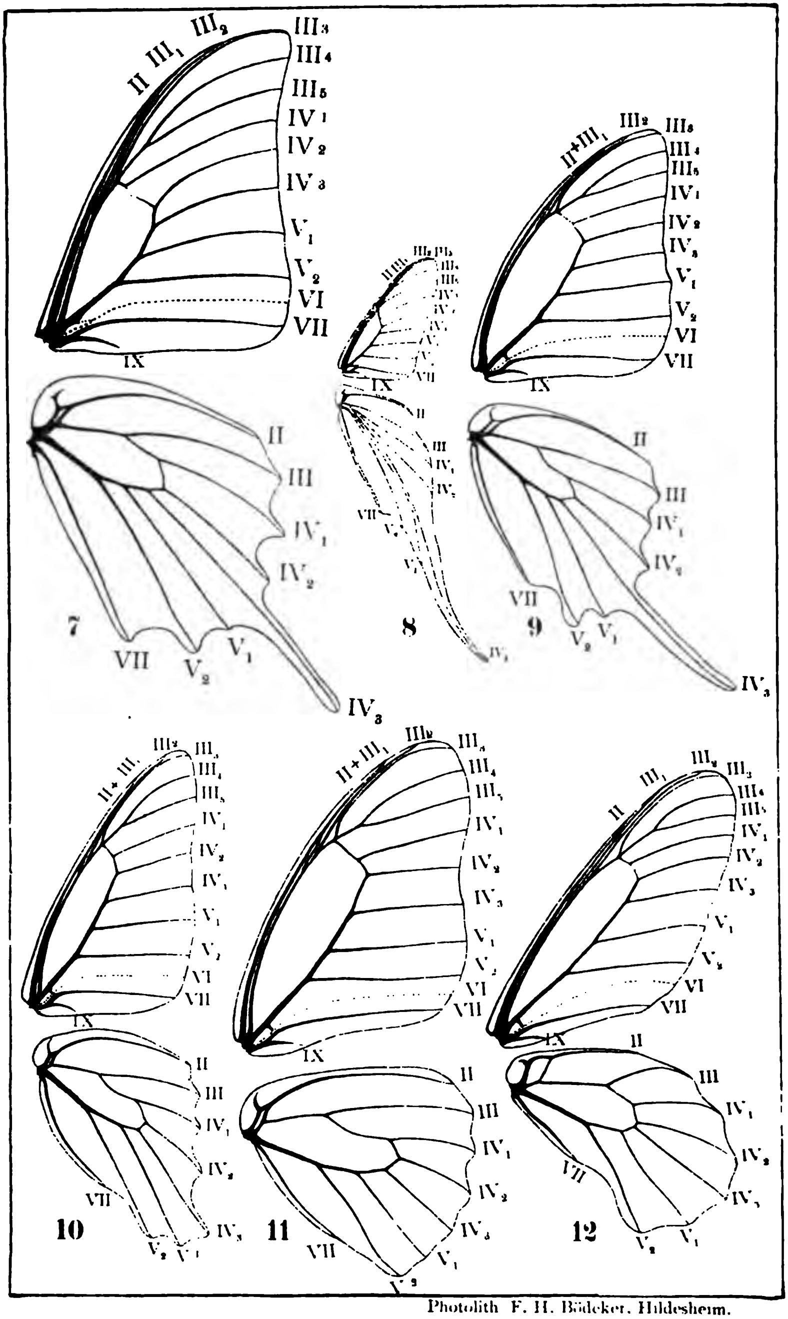
The diphylism of the diurnals is founded by me on the following characters:

A. Butterflies having a short anal vein on primaries, running from base to internal margin; on secondaries only one internal vein....................................PAPILIONIDES.

B. Butterflies wanting the anal vein on primaries, instead vein vii is forked at base (viii), this fork sometimes wanting through degeneration, and having more than one internal vein on secondaries..............................HESPERIADES.

All the Hesperiades examined by me have two internal veins to the hind wings, except *Pseudopontia*, which has three. This peculiar butterfly has the radius strongly specialized, and the retention of the third internal vein may have been necessitated by the circular shape of the wings. Theoretically it may be considered that all the diurnals possessed primitively three internal veins, in addition to the fold (vi), of which the Hesperiades, with the exception above noted, have parted with one, the Papilionides with two veins. In this particular the latter group are more specialized than all the other butterflies. The Saturniadæ, among the higher moths, have reached the same grade of specialization in this particular with the Papilionides. A diminution in the number of internal veins characterizes also certain of the more specialized groups of the Bombycides. The monotypic character of the Papilionides is evinced by the possession of vein "ix" of primaries, in which they appear to differ from all other butterflies, not by the number of internal veins, or by any other characters which they can be shown to share with other lepidoptera. Throughout my writings I have tried to show the direction of the evolution taken by the neuration, and I have accounted for the principal changes in position of the veins by their following these directions in spe-

PROCEEDINGS AM. PHIL. SOC. VOL. XXXVIII, NO. 159, PLATE IV.



Photolith F. H. Bödeker, Hildesheim.

A. Radcliffe Grote — Wings of Butterflies.

EXPLANATION OF PLATE IV.

The figures are obtained by an improved photographic process. The veins are numbered according to the system Redtenbacher-Comstock: iii = radius, iv = media, v = cubitus. Vein "ix" of primaries, the principal character of the Papilionides, is numbered in red. The figures are of the natural size.

FIG. 7. *Teinopalpus imperialis* ♂.—Type of genus and family. The neuration is specialized, as compared with the Papilionidæ. The cubital cross-vein is represented only by a residual mark. An intermediate type, with the breaking up of media on primaries taking the Parnassian direction, but an isolated offshoot from the Papilionid stem.

FIG. 8. *Leptocircus curius.*—Type of genus. A specialized form of Papilionidæ with the hind wing inferiorly enormously developed and the cell reduced.

FIG. 9. *Pathysa antiphates.*—Type of genus. On hind wing the discocellular cross-vein is downwardly bent between ii and iii. *Iphiclides* agrees with this type, except that the first radial branch is free. In *Pathysa* the first radial branch fuses with subcosta. Eimer, in his work, does not regard the neurational features of *Pathysa.*

FIG. 10. *Zetides sarpedon.*—Type of genus. Agrees in certain structural neurational points with *Pathysa*, differing by the inferior development and absence of "tails" and by the shorter anal vein of hind wings. This group is specialized by the inferior discontinuance of cubital cross-vein.

FIG. 11. *Arisbe similis.*—Type of genus. Agrees with *Zetides* in structural points, differing by the rounded hind wings. Compare text.

FIG. 12. *Eurycus cressida.*—Type of genus. Specialization is shown by the shortening of vein vii of hind wings and by the inferior degeneration of cubital cross-vein. *Eurycus* and *Pachlioptera* are interesting from the way they reproduce, upon a different type of wing, the specialization of the abdominal margin of the secondaries of *Parnassius*, a character of convergence, by which the margin becomes inwardly curved and the internal vein shortened. This direction crops out, among otherwise distinct forms, throughout the Papilionides. Again, as a character of convergence we meet it in the Saturniades (Grote, *Beitrag zur Class. der Schm.*, S. 198, Fig. 1, *Callosamia*; S. 204, Fig. 9, *Rothschildia*; S. 206, Fig. 11, *Samia*).

EXPLANATION OF PLATE V.

The figures are obtained by an improved photographic process. The veins are numbered according to the system Redtenbacher-Comstock: iii = radius, iv = media, v = cubitus. Vein "ix" of primaries, the principal character of the Papilionides, is numbered in red. The figures are of natural size, except Fig. 15, which is reduced one-half.

FIG. 13. *Iphiclides podalirius.*—Type of genus, to be compared with figure of *Pathysa antiphates.* Cubital cross-vein degenerates inferiorly. **Between** ii and iii of hind wings the discocellular is downwardly bent, as in the *Idaides* group. Radial branches free to costa, a character which brings this genus into the typical group of *Papilio,* with vein iii_3, the third radial branch, opposite cross-vein. Thus the genus is partly intermediate and appears, on the whole, nearer allied to *Idaides,* or rather to *Pathysa,* than to *Papilio.*

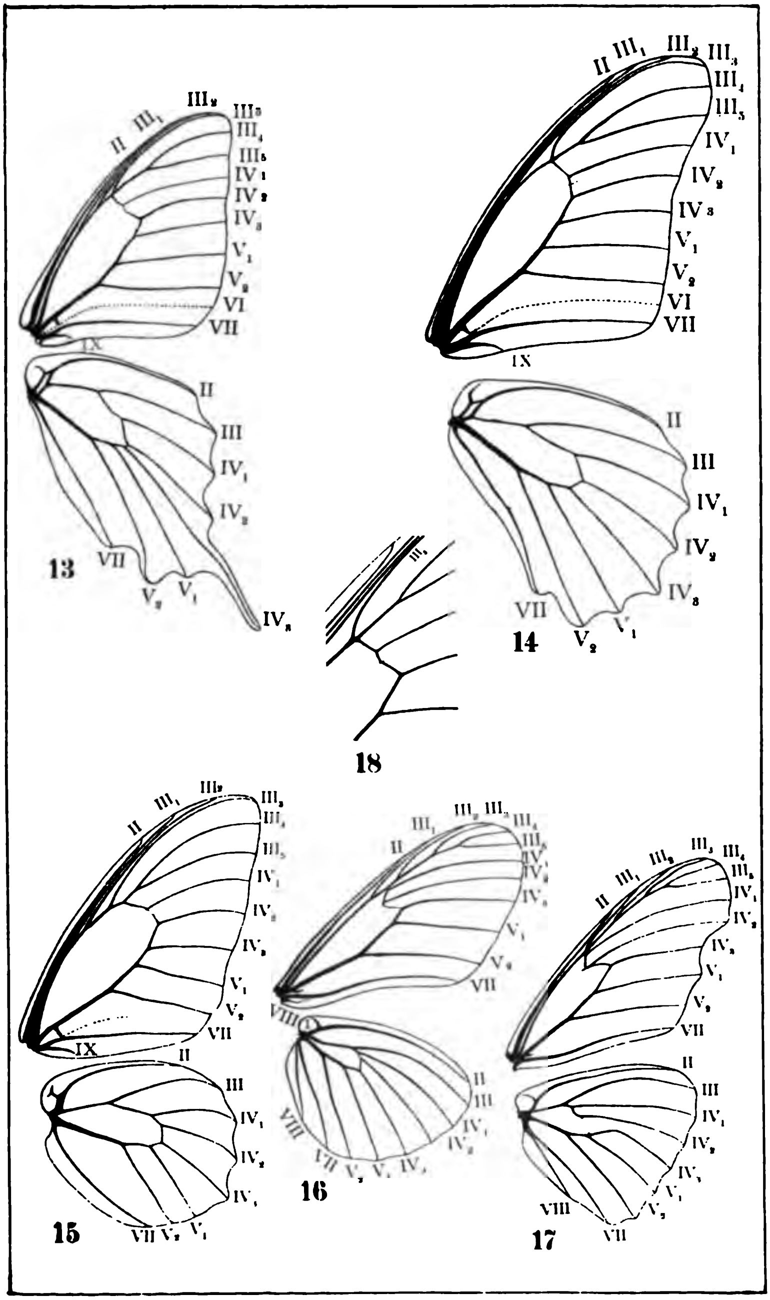
FIG. 14. *Priamides pompeius.*—Type of genus and belonging to typical group of *Papilio.* Compare text. [*Drurya antimachus,* mimetic of *Acræa,* not examined; probably belongs to the *Papilio* group as a specialized form.]

FIG. 15. *Ornithoptera priamus* ♂.—Type of genus. Note position of the third radial branch, which is thrown off before cross-vein. The furcation of iii_4 and iii_5 is long, so that the primitive condition which I assume, in which the longitudinal veins were all separate, is nearly attained. The total evidence is that *Ornithoptera* retains characters of the primitive form of the Papilionides. Compare wing with that of *Charaxes,* Schm. Hild., Taf. iii, Fig. 17, and Stein d. Weis., x, 282.

FIG. 16. *Heliconius antiochus.*—Type of genus and family. Belongs to the Hesperiades. Reproduced here to correct omissions in former figure; consult text. A more generalized form than the succeeding. Vein viii of fore wings partially degenerate; compare with figures of *Limnas* and *Libythea* in this respect, PROC. AM. PHIL. SOC., xxxvii, Pl. iii.

FIG. 17. *Dione iuno.*—Generic type. Vein viii of primaries lost, but traces of cubital cross-vein retained. Belongs apparently to the Nymphalidæ. Consult figure of type in PROC. AM. PHIL. SOC., xxxvii, Pl. ii. The open cell and condition of cross-vein on secondaries evidence the grade of specialization. Note that these figures of Hesperiades have two anal veins on hind wings, in contrast with the single vein of the Papilionides.

FIG. 18. *Tragonoptera brookeana.*—Section of ♂ primary wing, showing point of origin of third radial branch just before cross-vein. The position of *Papilio* has not been quite attained, while that of *Ornithoptera* has been abandoned.



Photolith. F. H. Bödeker, Hildesheim.

A. Radcliffe Grote — Wings of Butterflies.

CHAIRMAN'S ANNUAL DISCOURSE FOR 1899, ON THE TRANSMISSION OF ENERGY BY ELECTRICITY.

BY COLEMAN SELLERS, E.D., VICE-PRESIDENT.

(Read February 3, 1899.)

Gentlemen:—According to the old Rules of Administration and Order of the American Philosophical Society held in Philadelphia for the Promotion of Useful Knowledge, it was specified that some time during each year the President of the Society was expected to "deliver a discourse on some literary or scientific subject, accompanied by such suggestions with regard to the affairs of the Society as he shall judge proper." By the new rules, recently adopted, a date has been fixed for this discourse, with the further proviso that the President be authorized at his option to appoint one of the Vice-Presidents to take his place in carrying out the purpose of the rule. On January 14 of this year I received notice from our respected President that he had appointed me to this duty. I have selected as the subject of my discourse "Electricity as Applied to the Transmission of *Energy*," for a reason to be presently explained.

When the late Dr. William Pepper was elected a Vice-President he made much personal effort to excite an interest among the resident members in a scheme of quarterly meetings to be devoted to subjects of acknowledged importance, at which meetings a paper or papers on a subject selected for discussion should be presented, and a further effort made to insure the presence of, or correspondence from, all members who had given thought to the subject selected. He called on me soon after his election to induce me to prepare a paper on the transmission of *power* by electricity, or if I preferred not to do so, to have me suggest some one capable of carrying out the idea. At that time, about two years ago, he expressed some surprise that I should consider the subject-matter not yet far enough advanced practically for intelligent presentation or discussion. I promised, however, to correspond with my personal friends interested in electrical work to secure, if possible, contributions of importance that would be acceptable under the traditional requisites of matter fitted for our PROCEEDINGS or our *Transactions*. What has been or will be accomplished in this direction remains yet to be seen. Since that time the Society has seen fit to honor with membership many men of distinction in electrical engineering in its broadest sense. From some of these we may expect contributions.

Inasmuch as the founder of this Society, Dr. Benjamin Franklin, attracted attention as a scientist in the domain of natural philosophy by and through his electrical experiments, I think it advisable to call attention to the limited resources at his command, not only when he announced his belief that electricity and lightning were one and the same thing, but even up to the date of his death. I do so mainly to show the close interdependence between scientific research and the practical application of knowledge to the use of man, and further to show how much of the progress in exact scientific knowledge has been gained from the practical work done in experimental research by those who have not had the technical training or the knowledge of the higher mathematics, whereby they would have been able, to the extent of previously collected data, to formulate conditions leading to results in advance of the experimentation that alone can be depended on to prove the correctness of their deductions. I also desire to show how the growing wants of man have excited research, more particularly when commercial demand calls for the practical application of knowledge to any stated end.

Dr. Franklin was an experimenter. His interest in electricity as one of the then little understood but most interesting branches of natural philosophy was brought about through his ability to generate what he called "electric fire," and to exhibit the effects produced thereby, in conducting the simple experiments possible with the meagre apparatus at his command. It seems that he had received from a friend in London a glass cylinder or rod,[1] with which simple device, held in one hand and excited to produce electricity by being rubbed with a silken cloth, or the fur side of a catskin, he was able to charge Leyden jars or electric condensers, and thus exhibit the more striking effects of static electricity. The electric sparks from the outset may have impressed him as similar to the lightning flash of "thunder-storms."

In the order of chronological sequence, permit me to call attention to our records to connect this Society with his work. We know that Dr. Franklin, on April 5, 1744, eight years before his important electrical discovery, wrote to Mr. Colden explaining his idea of a Society for the Promotion of Useful Knowledge, which was the beginning of the American Philosophical Society. Some time between 1747 and 1750 Mr. Philip Syng[1] is credited with designing a glass globe electrical machine.[2] One of these electrical machines, in perfect order, said to have been the one Franklin made the most use of, is among the highly prized relics owned by the Franklin Institute in this city. All of us who have used electrical apparatus can appreciate the value of Mr. Syng's invention and the help it afforded to Franklin in his experiments. Franklin was, like Prof. Michael Faraday, an experimenter. Neither of these two great men possessed the mathematical habit of thought that distinguished so many philosophers before and since their time; both based all their knowledge on succcessful experiments.

---

[1] This rod, in its tin case, is in the collection of the Society.

In 1752 Franklin wrote to his friend in London, Mr. Collinson, expressing his grounds for belief in the identity of electricity and lightning. It matters but little now that this important letter was not deemed worth publishing in the *Transactions* of the Royal Society. Soon after it was received, however, Dr. Fothergill suggested its separate publication. Franklin's discovery thus reached and deeply interested Count de Buffon. It was translated into French, and was read by most learned men of the day. This remarkable and extensive recognition of the discovery induced the Royal Society in 1753, one year later, to make Dr. Franklin a member, without waiting for any formal application in the usual course, and without the payment of any fee or dues as a member. He was also honored the same year with the Copley gold medal for his discovery. Sir Humphrey Davy wrote of Dr. Franklin, in reference to his work, that "a singular facility of induction guided all his researches, and by very simple means he established very great truths. The style and manner of his publications are almost as worthy of admiration as the doctrines they contain. . . . . He has written equally for the uninitiated and for the philosopher."

Franklin's discovery, whether made by means of a kite in Philadelphia or by lightning rods in France, was turned to important use by his suggested protection of buildings from the effects of lightning, from "thunderbolts," or from the so-called electric fire of the clouds.

---

[1] Mr. Philip S. P. Conner says that Philip Syng in Franklin's time was a goldsmith.

[2] One such globe, mounted on an axle and provided with a driving pulley, was exhibited, belonging to the cabinet of the Society.

This practical application of his discovery, taken in connection with his improvements in fireplaces, his invention, given freely to the world, of the so-called Franklin stove, and other useful inventions, are proofs of his attention to the question of practical and useful results as the outcome of his philosophical studies based on experiments. To more fully understand the limited knowledge possessed in Franklin's day, even up to his departure from life in 1790, it should be borne in mind that not until 1774, when Dr. Joseph Priestley discovered oxygen, was the chemistry of to-day possible. Priestley's discovery took atmospheric air out of the list of simple elements, and was the beginning of the rapid advance in our knowledge of chemistry. Electricity also had no acknowledged connection during Franklin's lifetime with magnetism. Aloisio Galvani had noted an effect of electricity on animals (in fact, what is now known as galvanic action) in 1780, but what is of more importance to bear in mind, in connection with the limited knowledge possessed by physicists in Franklin's time, is the invention of the voltaic pile (which was the beginning of all galvanic batteries since used), was not perfected by Alexander Volta until 1800; therefore, Galvani's and Volta's discoveries had no place in Franklin's studies.

The American Philosophical Society has among its collection some interesting pieces of apparatus of Franklin's time, but, as bearing upon this brief outline of Dr. Franklin's contribution to our knowledge of electricity, a suggestion has been made by Dr. George F. Barker, that the American Philosophical Society shall in the near future examine into the authenticity of all the apparatus held as souvenirs in America by individuals and societies which are claimed to have been used by the founder of this Society. I must also call your attention to the claim that has been made to the effect that to Dr. Franklin and Count Rumford (Benjamin Thompson), both Americans by birth, "we owe the first important step toward a full appreciation of the co-relation of forces and the conservation of energy." The limited acceptance as true of this important fundamental law of nature, based on the assumption that there is only a given amount of energy available in nature for man's use, and that no effort of human intelligence can add to or increase the amount of such energy at our disposal, is shown by the ready credence given even at this late day to the claims of inventors of perpetual-motion machines, or the ready ear lent to charlatans who, by means of verbose pseudo-scientific jargon and fraudulent exhibitions in support, claim the discovery of some new and heretofore unrecognized power that is to supersede all known forms of energy utilized in the modern means for actuating machinery.

With the first conception of the electric telegraph electricity generated by galvanic batteries was used. The energy of the galvanic battery was transmitted to instruments which produced motion and thus made visible impression upon paper, or later by sound, to convey intelligence through the equivalent of dots and dashes, or by sight noting the vibration of a needle, all of which motions involved the transmission of power, no matter how little might be required for the purpose.

When electricity came to be transmitted for lighting purposes it was not in the form of what was generally accepted as the term power, but it was the transmission of a different form of energy, one only of the many forms that are co-related one to the other. It is in the very last decade of this century that the transmission of power has come to have a meaning of greater importance than was ever dreamed of in Franklin's day, or even when Michael Faraday and others laid the foundation of the mass of valuable knowledge that was ready to be used to advantage when the needs of man called for its practical application.

It is interesting to note that although the actual transmission of power in large amounts by electricity has been carried out chiefly in the last few years, yet what is now being accomplished is the result of knowledge that was obtained quite early in the present century. Faraday's great discoveries began in 1830, and these, with what had been contributed by a host of workers before him, bore fruit before the end of the first half of the nineteenth century.

I will not take up your time with recounting the steps that led up to what forms the substance of our scientific knowledge of electricity, nor to even mention the names of the great men who have contributed to our store of information. With electricity it is very much as in the case of the locomotive, that became an established fact and an important factor in our civilization in 1827, but was anticipated and predicted by those who in a crude way operated steam carriages on common roads before that date; and long before a fairly perfect locomotive was placed upon iron rails the railroad had been demonstrated to be of advantage even with animal traction in mining operations. The iron railroad and the steam engine on wheels had to be brought together to make a perfect whole.

The beginning of this century saw in our country and by our own people the first great steps taken to make our railroad system of transportation possible through the demonstration of the advantage of using high-pressure steam. This knowledge was necessary even to make the steamboat a commercial success on the inland waters of the United States. On March 2, 1825, at the end of the first quarter of this century, refrigeration by rarefaction of air was being discussed.[1] This fact will be worth remembering when I come to speak briefly of the recent transmissions of energy by other means than electricity. Prof. S. F. B. Morse, as early as 1832, had formed an idea of his electro-magnetic system of electric telegraphing, and in 1835 he constructed his first recording telegraph instrument and used it on short distances, but it was not until 1843 that Congress, after great opposition, voted the sum of $43,000 to construct the line of communication between Washington and Baltimore, which was put in successful operation by 1844, thus giving an illustration of long-distance transmission of power to energize the magnets that gave motion to the instruments required in telegraphy. On December 16, 1848, Prof. Henry, in his second annual report to the Board of Regents of the Smithsonian Institution, proposed that so far as the funds of the Institution would permit, the magnetic telegraph be used in the investigation of atmospheric phenomena, in order that notice of the approach of storms might be given to distant observers. This was just four years after the electric telegraph had been installed.

On March 19, 1853, forty-six years ago, Prof. Henry, in an address at the close of the exhibition of the Metropolitan Mechanics' Institute at Washington, explained the true relation between power and the means at command for transmitting and utilizing power. He pointed out an error in text-books even of that late day, when elementary machines—namely, the lever, the wheel, the axle, the inclined plane, the pulley and the screw, employed separately as instruments for the application of power, or in combination as parts of complex machines—were classed as "mechanical powers," "when every tyro in science," he says, "knows they have no power in themselves; yet, through a wrong name and a misapplication of the word power, a pernicious error is perpetuated long after the fallacy is understood." He gave a list of what could be classed as the primary powers as used by man. "First, water power; second, wind power; third, tide power; fourth, the power of combustion; fifth, the power of vital action," remarking that "the power of volcanoes and the internal heat of the earth were as yet unused powers." Beyond these few, he says, "science gives no indication of any other." He did not mention the direct heat of the sun as a source of power. He, however, remarked that "Gravitation, electricity, galvanism, magnetism and chemical affinity can never be employed as original sources of power; they are at the surface of the earth forces of equilibrium, the normal condition of which must be disturbed before they can manifest power, and then the work they can do is only (approximately) equal to the power which was communicated to them in disturbing their state of rest."

---

[1] See Prof. Jos. Henry's paper on this subject, read before the Albany Institute on the date above mentioned.

Electricity is not, he said, in itself a source of power, yet, what is very important from his point of view, "electricity, from its extreme mobility and high elasticity, affords the means of transmitting power with scarcely any loss and almost inconceivable velocity to the greatest distance; a wave of disturbance starting from the impulse given at the battery will traverse the circumference of the earth in less time than I have been occupying in stating the fact." This is interesting, but we are yet far from realizing the consummation of this idea. When Prof. Henry uttered these words the electric telegraph had become a public necessity, energy had been transmitted over great distances and people had ceased to wonder.

"The telegraph," he said, "could not possibly have been invented, the most ingenious synthetical mind could not have contrived the electro-magnetic telegraph, until Galvani and Oersted had made their discoveries." The transmission of power by electricity, however, has been possible, in varying degrees of efficiency, almost since 1832, and yet two years ago, as I said before, I felt that in its highest degree of efficiency I had not the right to say it could be presented, in a satisfactory way, to the American Philosophical Society in a manner worthy of its founder, who of all men of his day thought chiefly of the practical side of such a subject.

When Prof. Joseph Henry spoke of the possibility of transmitting an electric impulse around the globe, it was the impulse from a *galvanic battery*. No dynamo had been used in place of a battery, although instruments had been constructed to demonstrate the fact that the dynamo could be used. The electro-magnet was well understood, the electric impulse had been made to give motion to machines from electro-magnets and from permanent magnets, and the relation of the various forms of energy, represented by light, heat, magnetism, etc., were each and all known to be what has since been termed "modes of motion."

In the year 1876, marking a century in the age of our Republic, there was given to the world, through the grand Centennial Exhibition in Philadelphia, an object-lesson in the state of the arts and the advance of knowledge. The buildings in Fairmount Park, however, were not lighted by electricity, although the arc light, with clockwork to keep the carbons in proper relation to each other, was used for experimental purposes long before. As to the use of the arc light, on the 8th of December, 1858, the high light at South Foreland was illuminated by an electric current generated by one of Holmes' magneto-electric machines. In 1863 the electric light was applied to the lighthouse at La Hève, France. The chemical action of electricity was known when Carlyle and Nicholson discovered in the year 1800 that water could, by means of electricity, be resolved into its two component gases, oxygen and hydrogen, by means of the voltaic pile. Sir Humphrey Davy by the same means, seven years later, proved true Lavoissier's suspicion that the alkalies potash and sodium were not simple bodies, but compound, by the discovery of five new metals by electrolysis, viz., potassium, sodium, barium, strontian and calcium. I shall refer to one of these metals when I come to speak of the transmission of energy from one common source of power in a condition ready for use, either for turning the wheels of factories, for heating, lighting or repeating Sir Humphrey Davy's process in the production of sodium from an alkali, not as a laboratory experiment, but on a commercial scale at the rate of many tons per day.

In tracing the progress of knowledge bearing upon the transmission of energy by electricity, the United States Patent Office records furnish much information of a historical character useful for determining the chronological sequence of invention, and no more interesting chapter in the history could be obtained than that on the application of the modern dynamo by telegraph companies to supersede the galvanic batteries that for so many years supplied the electricity needed for their purpose.

There are to be found a number of patents relating to the regulation of the electro-motive force from the dynamo to equalize the pressure on lines of different lengths and different resistances. It was not, however, until lighting by electricity became a necessity in the most recent times that the great demand for electric machinery for lighting purposes, which so alarmed the gas companies, and threatened for a while even to destroy the value of the capital invested in this great branch of industry, namely, illumination by gas, became a commercial necessity. It was then that mechanical engineering talent of a high order was added to the electrical knowledge of the time to increase the efficiency of direct-current dynamos for lighting and for furnishing power in small amounts. Large establishments sprang up in Europe and in America for the manufacture of electrical machinery on an extensive scale, finally leading to the foundation of the present great corporations, whose stock is quoted among the "Industrials" listed on the Stock Exchanges of the country. Ten years ago, in 1889, these companies were doing a thriving business; yet at that time there had been little accomplished in the direction of the actual transmission of *power* by electricity, in contradistinction to the transmission of energy for lighting purposes.

I have preferred to entitle my discourse "The Transmission of Energy" rather than of "power," because the latter term serves rather to suggest kinetic energy, or the energy of matter in motion, while electricity permits the transmission of many sorts of energy. The turbine wheels at Niagara, nominally of 5000 horse power, generate kinetic energy from the water put in motion by gravity. The dynamo driven by the turbine delivers 5000 electric horse power; so efficiently is the change from kinetic to electric energy effected in this case by the dynamo that all the electric and magnetic losses in that part of the machinery amount to less than two and one-half per cent., apart from the losses due mechanical friction and windage, which are light as compared to what has been done by smaller units of power.

In the autumn of 1889 I was asked to submit a report on the transmission of power by electricity by gentlemen who had become interested in what was then known as the Evershed scheme of utilization of power of Niagara Falls, on land above the head of the

American Rapids, and above the entrance to the canal that was constructed more than forty years before to carry water from the Niagara river to factories located on the edge of the cliff, where the fall obtainable for turbines was as much as two hundred feet, though only from ninety to perhaps one hundred and twenty feet fall had been used to drive turbines. Mr. Thomas Evershed, when Chief Engineer of the State of New York, conceived the idea of locating turbines in wheel-pits sunk to a sufficient depth upon the level land above the rapids, where, under a head of sixty to one hundred feet, turbines could be operated by water carried to them through short surface canals, while the discharge from the turbines could be carried away by a tunnel serving as a tail race, this tunnel to proceed in a direct line under the city of Niagara Falls to the gorge below the falls. His scheme had been made the foundation of a charter granted to a company to construct the tunnel and such canals as might be needed for power and sewerage purposes, whereby the land on the river bank above the falls might be utilized as a manufacturing area, as at Lowell, Holyoke and other places where industries have prospered through the enterprise of the companies controlling the water privileges.

To carry out the Evershed plan involved the expenditure of very large sums of money for the tunnel and for surface canals. To effect the purpose, the Niagara Falls Power Company was organized in 1890. The Cataract Construction Company and other allied companies were started at the same time to execute the work, to improve the lands owned or controlled by those interested and to furnish transportation facilities to a large industrial district, where a uniform water power, without fear of low water or freshets, would be obtained. In the first conception of this water-power company, a central station was contemplated from which power might be transmitted to Buffalo and elsewhere, either by electricity or by some of the several modes of transmission of power already used to some advantage in Switzerland and elsewhere, where water power is abundant, coal costly and transmission for a few miles by wire rope or other means had been undertaken with marked success.

In July, 1890, I was suddenly summoned to London to confer with Mr. Edward D. Adams, the President of the Cataract Construction Company, who was alive to the great advantage of long-distance transmission by electricity, his idea being that the centralization of power and its transmission by electricity over the whole territory was feasible; hence he ordered work stopped until a careful examination could be made as to the state of the art of electricity in comparison with other modes of transmission.

To obtain reliable information on this important subject, the Niagara Falls International Commission was organized in July, 1890, with Lord Kelvin as Chairman; Prof. Wm. C. Unwin, Dean of the South Kensington Technical School, as Secretary; Prof. E. Mascart, of Paris, as representative of France, the birthplace of the modern turbine water-wheel; Col. T. Turrettini, Mayor of the City of Geneva, an engineer of great note, as representative of Switzerland, and as the engineer of the works at Geneva where power was being transmitted by water under high head; and I was appointed the representative of the United States and of the company for which the information was to be collected. By and through the work of this Commission, the opinion of engineers and engineering companies was obtained as to the best way of developing the power on the land of the company, under conditions laid down by the American company, also the utilization by transmission of the power so developed. A sum of money was paid to each competitor to cover the cost of reports, while premiums were offered to those who should present feasible schemes that could be immediately made use of for either or both of the two parts of the scheme—first, the generation of power, and, second, its transmission.

The information so gained represented the accumulated knowledge of men who could speak knowingly as to the state of the art on both of these subjects at that time. It was well worth its cost, but no perfect scheme, ready for immediate adoption and worthy of the highest premium, was presented. The Westinghouse Electric and Manufacturing Company, of Pittsburg, already interested in utilizing the alternating-current system for lighting and power purposes, having previously spent enormous sums of money to develop the alternating-current motors, generally known as the Tesla system, refused to compete on the ground that what would be offered in 1890 and 1891 could not possibly be what they might be able to submit in 1893; nor could any one suggest what would meet all the conditions which might arise during the development of the hydraulic part of their enterprise on a scale so much larger than ever before undertaken. This non-competing company, however, a few years after executed much of the work required.

A majority of the Commissioners favored the transmission by direct current, but as they were not asked to express an opinion in that direction, there was no report made as to the character of the electric current if electrical transmission should be decided upon; but a unanimous opinion was given as to the advantage of a unit of 5000 horse power for each turbine in the power house, working under a head of not over 140 feet fall, at a speed of 250 revolutions per minute, which was feasible with turbines that could be made of high efficiency.

The speed recommended was thought to be what would be acceptable to makers of dynamos, whether for alternate or direct current. It is noteworthy, as indicative of the state of the art in 1891, that out of many electrical schemes proposed all but two were based on the generation of the direct current, with the consensus of opinion in favor of the gramme ring as the type of armature.

While waiting for the reports of competing engineers to come in, between July of 1890 and the first of January, 1891, I had time to visit Italy, France, Switzerland and England, where I collected information as to the efficiency of the several modes of transmitting power at that time in vogue. I could find but one example in France of power for factory purposes transmitted by direct current, in which case a turbine was located in a rugged mountainous district, quite inaccessible in winter. The water-wheel, of perhaps 200 horse power, drove a direct-current dynamo, from which the current was conveyed by overhead conductors to a direct-current motor in a paper-mill, in a small town, a distance of five miles. This paper-mill had been operated without profit by steam, but was said to be profitable under the new conditions. The machinery in this case was started and stopped at the turbine by means of telephone communication from the mill to the men in charge at the water power. I visited many interesting plants for the transmission of power by water under pressure and by compressed air, and saw the most important electrical developments for lighting purposes, some by the alternate current, but most by the use of the direct current.

In Paris I made a careful examination of the Popp system of compressed air with great interest, on account of the highly favorable reports that had reached me and the claims as to efficiency and economy made by the projector. He even went so far as to say that in case of transmitting power from a central station to an outlying electric light plant he would use compressed air for the purpose, using air to drive the engines connected to the dynamos at the lighting stations, instead of transmitting electricity ready for immediate use. Among his various plans of using compressed air, besides operating air motors, elevators and the like, he had published a long list of uses to which it was applicable; he also submitted to the Government his cold storage scheme. In the event of foreign invasion and the investment of Paris, when local industries might be stopped, he stated that by using the compressed air from part of his compressing plant to drive the engines that operated the compressors of the other part, and utilizing the exhaust from these air-driven compressors in the Government storehouses, he could thus lower their temperature to the required degree, on the principle of refrigeration by rarefaction of air after having exerted force, as discussed by Prof. Henry on March 2, 1825, and as afterward toward 1850 used for the artificial production of ice.

The alternate-current lighting plant of Deptford, London, established in 1889, was predicated on the possible generation of electricity in large units of 10,000 volts pressure. I spent much time in watching this experiment, which was in 1891 far from meeting the expectations of its promoters. The 10,000 horsepower engines and direct connected 10,000 horse-power dynamos were never finished.

In Rome I found the most promising scheme under way to utilize the water power at Tivoli to generate a single-phase, alternate current, to be transmitted a distance of twenty-five miles to the gates of Rome by overhead cables, at a pressure of about 5000 volts, with perhaps twelve per cent. loss in transmission. The Roman plant was interesting, as in it the question of rate of alternation per second had been considered, and Ganz & Co., of Budapest, had recommended the lowest periodicity, forty-two full alternations per second, as adapted to arc and incandescent lights on the same feeders. If the rate of alternation per second be less than forty-two full periods arc lights will pulsate, while in the case of incandescent lights by alternating current the rate of alternation may be carried as low as twenty per second, depending upon the thickness of the filament, with no perceptible effect on my eyes. But in common practice seventy-two full periods per second has been adopted by electric lighting companies, as thereby the local transformers that are used to reduce, from street conductors under a pressure of 2000 volts to 100 volts in houses, are small and inexpensive; much more so than if similar machines were wound for as low a periodicity as forty-two per second. This question of period or rate of alternation per second has since come to be recognized as an important consideration in the transmission of electric energy for power purposes, and bears directly on the question of efficiency, convenience and economy in the conduct of the power-house equipment at Niagara Falls. There is so much of interest that may be said on this subject that I am loath to leave it to speak of what resulted from the study of the problems between 1890 and 1893, when in 1893 the installation of hydraulic machinery was to be begun, and an electric system adopted and put in practice ready for operation. In 1895 but one single tenant, the Niagara Falls Paper Company, now using over 7200 horse power from the surface canal of the company, was and still is the only example we have of a factory controlling its own water power directly connected to its machinery, as at Lowell and elsewhere.

During the year 1893 all idea of extending the tunnel beyond a proposed power house, and all extension of surface canal with branches to supply local factories, was given up in favor of electrical generation and transmission thereof to the users in such form as to be acceptable to the industries established on the land of the company. In the year 1893, while the greatest pressure was being exerted to induce the Cataract Construction Company to adopt the direct-current system, Mr. Edward D. Adams and the other officers of the company had before them a diagrammatic plan showing a central station for the generation of alternate-current electricity, from which conductors were figured as leading to electric furnaces, to apparatus that was capable of converting the alternate current into direct current, either by synchronous motors driving direct-current dynamos or by step-down or step-up transformers and rotary transformers that accomplished the same end. Lighting by arc and incandescent lamps was provided for, and trolley lines were designated as in operation, while an overhead pole line was figured as transmitting the energy to Buffalo or elsewhere, at any required pressure. Nothing could be more convincing than this diagram to show the elasticity of the alternate current, which was confirmed by a practical exhibition offered at Pittsburg by the Westinghouse

Company, and later a similar exhibit was given at Lynn, Mass., by the General Electric Company, the former by bi-phase generation and transmission, the latter by tri-phase.

After a most careful study of the subject from a scientific and commercial point of view, the bi-phase system of twenty-five alternations per second was adopted by the Cataract Construction Company. When such a low rate of alternation was discussed, it was apprehended that the cost of static transformers would be so much increased as to more than counterbalance the efficiency promised by the lowering of the rate of alternation; but, as in many other cases, when a want is felt, the urgency of the want leads to improvements that entirely change the conditions; so in this case, while many predicted that static transformers of this low period would cost from fifteen to twenty or even twenty-five dollars per horse power, still when tenders were to be solicited a guarantee had been exacted that the price should not exceed five dollars per horse power, while in actual practice, in healthy competition, the machinery for the purpose was secured at a very much lower rate.

As to the results reached by the system adopted, I must call your attention to the remarkable character of the industries that clustered about the central station. In 1893 there were no bi-phase motors of high efficiency manufactured, as up to the last few years alternate-current electric lighting plants had not been adapted to the operation of highly efficient motors to take the place of steam engines. There were few if any applicants for power to drive machinery. No cotton mills or other textile industries sought cheap power when it involved the use of machinery that had yet to be perfected. Existing direct-current motors could be had in abundance, but manufacturers had not yet used them. The largest cotton or woolen mills required not over 1000 horse power to drive them, while most are on a smaller scale.

The advantages offered by the elastic electric system at Niagara Falls attracted industries that employed few hands, needed little machinery, but required enormous amounts of power, which, at a lower cost than steam and without an investment in engines and dynamos, could be used profitably.

The Pittsburg Reduction Company, engaged in the extraction of the metal aluminum from its ores, was the first applicant for 1500 to 3000 horse-power electric current from the new power-house. This process, known as the Hall process, required heat energy to melt the cryolite to form the bath in the electric furnace, and a direct current of low voltage to exercise electrolytic energy in separating the metal from bauxite, which is rich in aluminum. Another enterprise, the Carborundum Company, called for 1000 horse power, in alternate current of one phase only, for a process in which heat energy alone is needed to produce a new mineral next in hardness below the diamond. So with the manufacture of carbide of calcium from coke and lime, great heat alone needed was obtainable by alternate current. The Matheson Alkali Company, making caustic soda from common salt, needed no heat energy, but over 2000 horse power of direct current for electrolytic or electro-chemical energy in a cold process to separate the chlorine gas from the salt water, the gas being delivered into enormous lead-lined chambers, the floor of each chamber being covered with lime, enabled twenty-five tons per day of bleaching powder to be furnished to the market, while the caustic soda liquor, freed from chlorine, is concentrated by boiling in iron kettles to evaporate the water and thus leave caustic soda in solid form when cold. This caustic soda, delivered to still another factory near at hand, is by a direct current, furnishing heat and electrolytic energy, made to yield pure metal sodium, just as Sir Humphrey Davy did when, with the current from a galvanic battery, he produced and gave to the world a few ounces of the new metal. The ingots of sodium, as made by the Chemical Construction Company, at Niagara Falls, are dipped into coal oil and thrown into tin cans, to be closed air-tight, ready for the market, or at once, by a simple process, converted into peroxide of sodium, one of the most powerful oxidizing reagents required in the arts. Factory after factory has been added, for various electro-chemical processes, while the establishments first started have grown in size calling for power in a rapidly increasing ratio.

While these industries were developing, electricity has been furnished to the lighting station to replace steam as the motive power, and a direct current is being delivered to the trolley lines of Niagara Falls and Buffalo. By the time the development was in shape to offer power to Buffalo, and the cost of installation was being worked out there, one great advantage of the tri-phase system over the bi-phase that had been adopted was urged as an important argument against what had been done. This advantage comes from the fact that the bi-phase transmission needs four cables, two for each phase, while the tri-phase system is worked with three cables only, each of the three cables being no larger than each of the four demanded by the bi-phase system. This advantage had been taken into consideration, but other economies incident to the bi-phase had overbalanced the question of saving in copper in the line. Before the line to Buffalo could be built, however, and as a striking instance of an urgent need of exciting the talent of inventors to supply the want, Mr. C. F. Scott, of the Westinghouse Company, startled the electricians at a meeting in Washington with his scheme of converting the bi-phase current into a tri-phase in the static transformers that are used to raise the electro-motive force of the current from 2200 volts to 11,000 volts or more—this without adding one dollar to the actual cost of the transformers needed, and with the saving of twenty-five per cent. in the copper used, which must be credited to the tri-phase transmission. So that while the low frequency adopted increased the efficiency of the plant, and favored many operations of the power plant, the first cost was not affected by the prophesied high cost of transformers, and all the advantages incident to both systems were obtained not only without an increase of the first cost, but a direct saving in the copper of the line. As the plant grew in size, many of the difficulties that had been expected in handling such an immense volume of electricity as was involved did not occur, and it was evident that the practical electricians attached to the great manufacturing establishments of electrical machinery had brought the appliances needed well up to the requirements of the new conditions. Every machine, every instrument needed, had to be contrived, not only to suit the size of the unit of 5000 horse power, but to meet the unknown effect of coupling so many great machines in parallel and distributing the current to establishments over which the attendants in the power-house have little or no control.

In thus referring to the utilization of power at Niagara Falls, I may seem to depart from the subject of transmission of energy, although the development of the industries described is intended to illustrate the direct results obtained by transmitted energy. The energy developed at the dynamos in the power-house, and existing as potential only while the dynamos are in motion, begins with an electro-magnetic force of 2200 volts, at which 5000 electrical horse power is transmitted by four cables, each 1¼″ in diameter, two cables for each phase of each dynamo, to the bus bars from which the current is distributed at from 2200 to 2000 volts (depending on distance) to points outside of the power-house within a radius of two miles. By means of step-up transformers 10,000 electric horse power of induced current of 11,000 volts can be carried to Buffalo by six cables, each 5/8″ in diameter, and capable of transmitting 10,000 electric horse power at the said voltage, or double that amount, at 22,000 volts, with a loss, based on Lord Kelvin's law of economy as to size of conductors.[1] You can better realize the idea of the size of the conductors when I tell you that from each turbine exerting over 5000 horse power a steel shaft 11″ in diameter is needed to drive each dynamo delivering 5000 electrical horse power, from which are carried the conductors of the sizes named. Four bus bars receive the current from five dynamos, the heaviest part of each bus bar being 3″ in diameter; *i. e.*, one 11″ steel shaft transmits kinetic energy of 5500 horse power; four 1¼″ cables transmit 5000 electric horse power energy of 2200 volts; three 5/8″ cables transmit 5000 electric horse power to Buffalo.

Besides the development of power at Niagara Falls, to which I have called your attention, numerous successful installations in various parts of our country could be referred to, and even in Europe we find the transmission of power by alternating current in existence, and, in fact, in some instances preceding in actual operation the starting of the plant at Niagara Falls; such installations being on a smaller scale required less time to construct them.

---

[1] Lord Kelvin proposed, in determining the size of conductors for electricity, that the most economical area of conductor is that for which the annual cost of energy wasted is equal to the interest on that portion of the capital outlay which can be considered to be proportionate to the weight of the metal used; that is to say, the amount of copper and other details of the transmission line, the interest of which should equal that amount of energy at its cost of production that may be wasted. The lower the cost of the power generated the more energy may be wasted to advantage. If too large a conductor is installed for the purpose of decreasing the loss, the capital outlay will be needlessly great. If too small a conductor is adopted the waste of energy will be too great, hence the importance of a law that indicates what the economical loss should be. In applying this law there is more or less divergence of opinion as to what part of the capital outlay should be taken into consideration in determining the amount to be wasted. As, for instance, an underground conduit system may be built to accommodate a great increase of the number of conductors installed, or when a pole line is erected for a given amount of power, additional conductors may be supported on the same poles without any great increase of the cost due to enlarging the capacity of the transmitting line. The law, therefore, bears with most force on the metal if naked or the cable if the conductor is insulated.

The experiments of Mr. Tesla, which were directed toward the utilization of an alternate electric current of high frequency, and which were conducted in the interest of the Westinghouse Company, resulted in the issue of at least twenty-nine patents to cover the multiphase generation of electricity. The first of these patents was issued as early as 1888, and the last in 1891, and yet in 1893, so far as I am aware, there were no examples of the Tesla motors in commercial operation, for the reason that up to that time—and, in fact, not until 1895—the conditions had not been favorable to its development. As soon as there seemed to be a demand for their use, however, the manufacturers placed them on the market with as high an efficiency as the best direct-current motors, with this further advantage that is of the utmost importance: A direct-current motor and a direct-current dynamo are limited in their electro-motive force by the commutator necessary for their operation. The earliest alternating-current motors were what are known as synchronous motors; that is, motors that when started would run in step with the dynamo from which the current proceeded. These motors had no self-starting power, and involved many objectionable features that are not incident to polyphase motors of the induction type—in other words, what we know as the Tesla motor. In the first place, and as of vital importance, a Tesla motor can be wound to suit high voltage. Electricity at 2000 volts can be carried with absolute safety by properly insulated cables into buildings and applied directly to the motor without any live terminals; that is, without any part carrying current being exposed from which a dangerous shock of electricity can be obtained. They are all self-contained. They start with a powerful torque upon completing the circuit; that is, they start when the switch is closed and stop when the switch is open. Here is the possibility of an ideal electric motor, which is perfectly well understood by professional electricians, but about which the public have yet to be more thoroughly informed.

Though I have said that little was known about the alternating current in practice until lately, yet I have before me a copy of a letter written by Mr. L. B. Stillwell, one of our members, the Electrical Director of the Niagara Falls Power Company, when he was on the staff of the Westinghouse Company, dated May 11, 1893, in which he said: "I received yesterday from our engineer in charge of the installation at Pomona, Cal., a report of tests which he had been making, and I think you will be interested to learn that he has successfully transmitted 130 horse power over eighty-four miles of bare copper wire, supported upon our special insulators; the length of the circuits being eighty-four miles, the conditions are of course such as we should encounter in transmission over forty-two miles. The result was obtained by connecting up in series the respective circuits from the power plant to the town of Pomona and the city of San Bernardino. About 3200 insulators supported the conductor carrying 10,000 volts, and the fact that this was done without the slightest evidence of break-down was noteworthy and important." Since then on some of the Western lines 20,000 volts have been considered moderately low voltage, and 40,000 volts have been used successfully, and this all since the year in which bids were first asked for polyphase alternating-current dynamos under stated conditions by the Cataract Construction Company for the Niagara Falls Power Company at Niagara.

Mr. Edward D. Adams, the president of the Cataract Construction Company, to whom the above letter was addressed, was thoroughly alive to the advantage of the use of the alternating-current system in 1890, but in financiering the great development at Niagara Falls he held his mind open for truth, which he steadily pursued from the beginning, sustained by those interested with him, regardless of his own pecuniary interest and that of his personal friends.

My own interest in electricity began in early boyhood. As soon as I was able I followed the discoveries of Faraday and others experimentally, using instruments made by myself for the purpose. From 1846 to nearly 1849 I was engaged to superintend rolling iron and making the telegraph wire that was used in the first lines established west of the Allegheny Mountains. Keeping in touch with progress of the uses to which electricity has been applied, I have noted how powerfully the growing needs excite the inventive faculty of those engaged in any one branch of science; in general, also, the slow application to actual practice of knowledge given to the world by men seeking truth and laying the foundation of exact scientific methods. Our modern knowledge of thermo-dynamics does not express what was used to perfect the steam engine, as the best results and the greatest advance in the use of steam came before the students of thermo-dynamics gave us the modern text-book on the theory of steam. So it is with the transmission of energy by electricity: beyond the possession of useful knowledge, actual practice and the attempt to accomplish results will yet need many venturesome efforts.

In utilizing the power of Niagara Falls large units of power have been shown to be economical. A single dynamo built to yield 5000 electrical horse power has yielded 5600 electrical horse power without sign of overload. The wonderful efficiency of these machines, which have a loss of less than two and one-half per cent., has established the superiority of electrical transmission of power, and proved it to be more economical than any of the usual methods of transmission by material in motion; that is to say, by shafting, belting or compressed air, etc. All such methods involve great frictional loss. When a steam engine is attached directly to a dynamo, the electrical output of the dynamo, measured by modern instruments of precision, is known to be more reliable as an indication of the power produced by the combustion of a given amount of coal than any ordinary method of indicating the power of a steam engine to determine the horse power per pound of coal burned. Large factories, such as the Baldwin Locomotive Works, have recognized the economy of generating electricity by steam and transmitting it to the various machines or groups of machines in use, to which electric motors are applied, thus dispensing with long lines of shafting. How far electricity can be transmitted from the turbines at Niagara Falls with profit remains yet to be determined. The actual economy obtained by transmission to Buffalo, say a distance of twenty-two miles, is so much beyond what was predicated as possible in 1890, or even 1893, that no one can venture to say what will be forthcoming in the near future. With electricity it is very much as it was with railroads; fifteen miles per hour was thought to be a dangerous speed when locomotives began to supersede the stage coach. Those who travel now hope for an improvement that will lead to a higher rate of speed than we are now accustomed to. So it is with electricity by overhead lines of transmission. One thousand volts is no less dangerous than 11,000 volts on the Buffalo line, or 20,000 or 30,000 on some of the air lines in this country.

The question of underground transmission calls for a high quality of insulating material or method of preventing leakage, and of providing means of dissipating the heat that must result from any loss due to resistance in the conducting material used.

than ever before undertaken. This non-competing company, however, a few years after executed much of the work required.

A majority of the Commissioners favored the transmission by direct current, but as they were not asked to express an opinion in that direction, there was no report made as to the character of the electric current if electrical transmission should be decided upon; but a unanimous opinion was given as to the advantage of a unit of 5000 horse power for each turbine in the power house, working under a head of not over 140 feet fall, at a speed of 250 revolutions per minute, which was feasible with turbines that could be made of high efficiency.

The speed recommended was thought to be what would be acceptable to makers of dynamos, whether for alternate or direct current. It is noteworthy, as indicative of the state of the art in 1891, that out of many electrical schemes proposed all but two were based on the generation of the direct current, with the consensus of opinion in favor of the gramme ring as the type of armature.

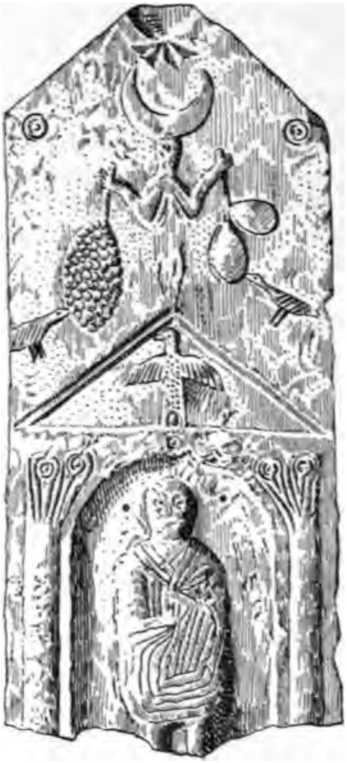
While waiting for the reports of competing engineers to come in, between July of 1890 and the first of January, 1891, I had time to visit Italy, France, Switzerland and England, where I collected information as to the efficiency of the several modes of transmitting power at that time in vogue. I could find but one example in France of power for factory purposes transmitted by direct current, in which case a turbine was located in a rugged mountainous district, quite inaccessible in winter. The water-wheel, of perhaps 200 horse power, drove a direct-current dynamo, from which the current was conveyed by overhead conductors to a direct-current motor in a paper-mill, in a small town, a distance of five miles. This paper-mill had been operated without profit by steam, but was said to be profitable under the new conditions. The machinery in this case was started and stopped at the turbine by means of telephone communication from the mill to the men in charge at the water power. I visited many interesting plants for the transmission of power by water under pressure and by compressed air, and saw the most important electrical developments for lighting purposes, some by the alternate current, but most by the use of the direct current.

In Paris I made a careful examination of the Popp system of compressed air with great interest, on account of the highly favorable reports that had reached me and the claims as to efficiency and economy made by the projector. He even went so far as to say that in case of transmitting power from a central station to an outlying electric light plant he would use compressed air for the purpose, using air to drive the engines connected to the dynamos at the lighting stations, instead of transmitting electricity ready for immediate use. Among his various plans of using compressed air, besides operating air motors, elevators and the like, he had published a long list of uses to which it was applicable; he also submitted to the Government his cold storage scheme. In the event of foreign invasion and the investment of Paris, when local industries might be stopped, he stated that by using the compressed air from part of his compressing plant to drive the engines that operated the compressors of the other part, and utilizing the exhaust from these air-driven compressors in the Government storehouses, he could thus lower their temperature to the required degree, on the principle of refrigeration by rarefaction of air after having exerted force, as discussed by Prof. Henry on March 2, 1825, and as afterward toward 1850 used for the artificial production of ice.

The alternate-current lighting plant of Deptford, London, established in 1889, was predicated on the possible generation of electricity in large units of 10,000 volts pressure. I spent much time in watching this experiment, which was in 1891 far from meeting the expectations of its promoters. The 10,000 horse-power engines and direct connected 10,000 horse-power dynamos were never finished.

In Rome I found the most promising scheme under way to utilize the water power at Tivoli to generate a single-phase, alternate current, to be transmitted a distance of twenty-five miles to the gates of Rome by overhead cables, at a pressure of about 5000 volts, with perhaps twelve per cent. loss in transmission. The Roman plant was interesting, as in it the question of rate of alternation per second had been considered, and Ganz & Co., of Budapest, had recommended the lowest periodicity, forty-two full alternations per second, as adapted to arc and incandescent lights on the same feeders. If the rate of alternation per second be less than forty-two full periods arc lights will pulsate, while in the case of incandescent lights by alternating current the rate of alternation may be carried as low as twenty per second, depending upon the thickness of the filament, with no perceptible effect on my eyes. But in common practice seventy-two full periods per second has been on behalf of Mr. Perry, which was brought from Carthage. He said:

It was in the spring of 1864, if my memory serves me correctly, that, at the urgent request of the Consul-General of the United States, Mr. Amos Perry, the U. S. S. "Constellation," of which I was an officer, paid a visit to the Bey of Tunis, as trouble with the Bedouins had caused alarm among the European residents.



Carthaginian Tombstone.

The Consul requested my father, Captain Henry S. Stellwagen, U. S. Navy, to bring two gravestones or stelæ to this country and send one each to scientific bodies in Philadelphia and New York. The one exhibited here this evening was first given into the care of the Academy of Natural Sciences, but afterwards, at the suggestion of an officer of that body, it was sent to the American Philosophical Society.

At the time of our visit the ruins of Carthage were so completely hidden by the overlying soil and fine débris that the localities of the famous city were but vaguely known. This stone stela was found in the region of the temple of Astarte, and by many of those who examined it the relief was considered to be a figure of the Goddess Astarte feeding carnivorous, and presumably sacred, animals with the entrails and genitals of the victim of a sacrifice.

I was discouraged at the very meagre results obtained by antiquarians who had studied the locality, and shocked to contemplate how entirely that great city was obliterated. Once she claimed to control the whole western Mediterranean Sea so effectually that "no one could wash his hands in it without her permission." Her fleets and armies, her agriculture and pomology, her stock raising and her temples are only known to us through her enemies, the Romans ; but these naturally biased historians freely acknowledged that she excelled the world. At the time of our visit only mounds of earth were to be seen there, covered with very small fragments of different-colored marbles, some fine large pieces of marble steps that evidently had formed portions of a great stairway to the sea gate, and a number of large subterranean reservoirs supposed to have been used for water storage, these being in pretty fair condition, and in strong contrast with the utter and absolute ruin of all else.

Which was followed by a verbal communication by Dr. Morris, as follows :

It has been said that Abdel Kader when brought as a prisoner to Paris was taken to Versailles and asked his opinion as to the celebrated paintings of the battles in Africa, where he had borne such an heroic part. He replied that "if an Arab had portrayed them he would probably have done so very differently." It is well for us to remember that nearly all we know of the Carthaginian empire, people or customs has come to us through Roman sources, and that the "Punica fides" which we have learned of in our childhood might seem very different if heard of from the other side. While I would not be considered as an apologist for the worship of Astarte, which we know of from Syrian and Phœnician as well as from Greek and Roman sources, passing as it does into that of Aphrodite and Nero, of Venus and Juno, or of sexual love, whether normal and pure or abnormal and illicit, it still remains true that

> C'est toûjours l'amour, l'amour,
> Qui fait le monde à la ronde.

Human nature has been and is the same in all climes, ages, civilizations and religions ; and it behooves us in inquiring about them to treat them fairly as we would seek to have done to our own views. It is in this manner I would study this relic, all too rare, as our friend, Dr. Thomas C. Stellwagen has just shown us, of Carthaginian civilization. It is a white sandstone slab, the lower part of which has been broken off and the upper corners sloped nearly but not quite to a point. It is 2 feet 5 inches [illegible] At the top is a ✱, [illegible] on each of the corners [illegible] concentric circles ⊙, which [illegible] Mars and Jupiter?) : and on the [illegible] Astarte with its crescent, holding a [illegible] and in the [illegible] Under this figure of Astarte, [illegible] fertility and prosperity [illegible] of a temple or house with [illegible] is the figure of a [illegible] circa 150 A.D.) [illegible] of an emperor among [illegible] pyre so that when it [illegible] soared aloft bearing [illegible] and the Imperator became [illegible] in the porch of [illegible] the region presided over by [illegible] Order still prevail ? and [illegible] by the most of us [illegible]

[illegible] vault or sarcophagus [illegible] near the shores of the [illegible] into the real beliefs [illegible] Beyond.

[illegible] is a small hole such as [illegible] which may have covered this [illegible] in old cathedrals. [illegible] the man's name, would [illegible]

[illegible] presiding officer.

[illegible] Meeting, May [illegible], 18[illegible].

[illegible] in the Chair.

Present, [illegible] members.

[illegible] read an obituary notice of the late [illegible]

The Secretaries announced the death at Philadelphia, on May [illegible] of Alexander Biddle, aged [illegible] years.

The following papers were read :

By Mr. R. H. Mathews, of Parramatta, New South Wales, "On Divisions of North Australian Tribes."

By Dr. Rudolph Buti, of Baltimore, "On an Interesting Fragment of the Book of the Dead."

By the Committee on Historical Manuscripts, "A Calendar of the Weedon and of the Richard Henry and Arthur Lee Correspondence in the Library of the Society."

Dr. Samuel G. Dixon was elected a Councillor to fill the unexpired term of Gen. Isaac J. Wistar, made vacant by his election as a Vice-President of the Society.

Mr. Harold Goodwin presented a framed engraving of John Vaughan, who had served the Society as Secretary in 1789 and 1790, as Treasurer from 1791 to 1841, and as Librarian from 1803 to 1842, and on motion the thanks of the Society were returned therefor.

The Society was adjourned by the presiding officer.

DIVISIONS OF NORTH AUSTRALIAN TRIBES.

BY R. H. MATHEWS, L.S.

(Read May 5, 1899.)

The division of a tribe into intermarrying sections or classes, although one of the most interesting of the institutions recognized among the Australian aborigines, has not hitherto received the attention which its importance deserves. In a former number of the PROCEEDINGS of this Society[1] I tabulated the names of eight sections, with the rules of marriage and descent in force over a large extent of country in the Northern Territory. Since then I have reported[2] a similar eight-section system, but with different sectional names, in the northwest corner of Queensland, extending southerly from the Gulf of Carpentaria for a distance of about three hundred miles, including the Wentworth, Nicholson, Gregory and Upper Georgina rivers.

In an article contributed to the Royal Society of New South Wales in June, 1898, I described the eight sections of the Arrinda tribe on the Finke, Todd and other rivers,[3] but, while that paper was in the press, a correspondent furnished me with additional information which shows the line of descent in a manner that is more readily understood than by the table appended to the article in question. I propose, therefore, to supply a new table, showing how the divisions intermarry, with the sections to which the offspring belong, as follows:

---

[1] PROC. AMER. PHILOS. SOC., xxxvii, 151–154.

[2] *Journ. Roy. Soc. N. S. Wales*, xxxii, 251, 252.

[3] *Ibid.*, xxxii, 72.

TABLE I.

	Husband	*Wife*	*Offspring*
GROUP A......	1. Panungka	Parulla	Pungata
	2. Mbutjana	Pungata	Ngala
	3. Knurraia	Ngala	Bultara
	4. Koomara	Bultara	Parulla
GROUP B......	5. Parulla	Panungka	Koomara
	6. Bultara	Koomara	Knurraia
	7. Ngala	Knurraia	Mbutjana
	8. Pungata	Mbutjana	Panungka

It will be observed by the foregoing table that the sons of the women of one group marry the daughters of the women of the other; and, also, that each group has perpetual succession through its females. For example, take the women of Group A in the table, we find that Parulla is the mother of Pungata; Pungata of Ngala; Ngala of Bultara, and Bultara is the mother of Parulla, and this order of succession is continually repeated.[1] Among the women of Group B the line of descent conforms to the same rules. I have traced some of the section names of this organization, namely, Bultara, Koomara, etc., across the country from the Upper Finke river northeasterly to the Georgina river, a distance of more than four hundred miles.

My correspondent also made some further investigations respecting the order of succession in four of the sections of the Warramonga tribe[2] at Tennant's Creek, with the result that it becomes necessary to prepare an amended table of one of the groups. As it might cause confusion to show only one group, I have included both in the subjoined table:

---

[1] The names of the eight sections of the Upper Finke river tribes were first reported by the Rev. L. Schulze in 1891 (*Trans. Roy. Soc. S. Australia*, xiv, 223, 224.) Their arrangement into two intermarrying gronps was the result of my investigations (*Journ. Roy. Soc. N. S. Wales*, xxxii, 72).

[2] *Journ. Roy. Soc. N. S. Wales*, xxxii, 73.

TABLE II.

		Husband	*Wife*	*Offspring*
GROUP A......	1.	Aponunga	Tungulli	Apungata
	2.	Ampajona	Apungata	Opalla
	3.	Ungary	Opalla	Kabajee
	4.	Akamarra	Kabajee	Tungulli
GROUP B......	5.	Tungulli	Aponunga	Akamarra
	6.	Kabajee	Akamarra	Ungary
	7.	Opalla	Ungary	Ampajona
	8.	Apungata	Ampajona	Aponunga

In Group A of the above table, the rotation of the section names is different from that given in my former table, which, necessarily, alters the order of descent among the women and children. Group B is the same as that previously given. If my correspondent is now correct, it can be shown by this table that a brother's son's children intermarry with a sister's son's children, instead of the son of a brother marrying the daughter of a sister, and *vice versa*, as stated in my former paper.[1] In examining the two tables, I and II, it is seen that the names of several sections in the Arrinda tribe are almost identical with some of the section names of the Warramonga.

On the McArthur, Kangaroo and Calvert rivers, in the Northern Territory, reaching thence along the shore of the Gulf of Carpentaria beyond the Queensland boundary, and extending inland about one hundred miles, are several native tribes, among which may be mentioned the Yuckamurri, Yanular, Leanawa, Yookala and Kurrawar. The following synopsis shows the section to which a man belongs—the section into which he can marry—and the designation of the offspring:

TABLE III.

		Husband	*Wife*	*Offspring*
GROUP A......	1.	Joolanjegoo	Jungalagoo	Bullaranjee
	2.	Jameragoo	Bullaranjee	Jooralagoo
	3.	Jinagoo	Jooralagoo	Bungaranjee
	4.	Yukamurra	Bungaranjee	Jungalagoo
GROUP B......	5.	Jungalagoo	Joolanjegoo	Yukamurri
	6.	Bungaranjee	Yukamurra	Jinagoo
	7.	Jooralagoo	Jinagoo	Jameragoo
	8.	Bullaranjee	Jameragoo	Joolanjegoo

---

[1] *Journ. Roy. Soc. N. S. Wales*, xxxii, 74.

Some native tribes on the Victoria river, in the Northern Territory of South Australia are segregated into two intermarrying groups, with the following subdivisions:

TABLE IV.

	Husband	Wife	Offspring
GROUP A......	1. Jamada	Jungalla	Dhalyerree
	2. Jameram	Dhalyerree	Joolam
	3. Janna	Joolam	Dhungarree
	4. Jummiunya	Dhungarree	Jungalla
GROUP B......	5. Jungalla	Jamada	Jummiunya
	6. Dhungarree	Jummiunya	Janna
	7. Joolam	Janna	Jameram
	8. Dhalyerree	Jameram	Jamada

If we compare Tables I, II, III and IV with the table of eight sections reported by me in a former article to this Society,[1] it will be observed that the four tables are constructed on the same system, and all contain the same order of succession. In other words, all the tribes dealt with have substantially the same organization, although there are dialectic variations, more or less, in the names of the sections. In the Tables I, II and III, I have omitted the feminine form of the name of each section, which, it is thought, will enable the reader more readily to follow the rules of marriage and descent. The divisional system, or social organization, reported in this article, extends from the Upper Finke river to the embouchure of the McArthur, in the Gulf of Carpentaria, a distance of about six hundred and fifty miles. I am informed by some of my correspondents that the same system, but with different divisional names, reaches westwardly from the Gulf of Carpentaria to the Daly and Victoria rivers, and onwards into West Australia.

The southern portion of the Arrinda and adjoining tribes occupy the Middle Finke and Charlotte waters, reaching as far south as the Macumba river. Among them there are only four sections employed to regulate the intersexual relations, as shown in the following table. These sections comprise four of those enumerated in Table I:

---

[1] PROC. AMER. PHILOS. SOC., xxxvii, 152.

TABLE V.

		Husband	*Wife*	*Offspring*
GROUP A......	1.	Panungka	Parulla	Bultara
	2.	Koomara	Bultara	Parulla
GROUP B......	3.	Parulla	Panungka	Koomara
	4.	Bultara	Koomara	Panungka

It will be seen that the community is segregated into two intermarrying groups, and that the children take the name of the complementary section in the division to which their mother belongs.

In the southern portion of South Australia there are a number of tribes who possess the two primary groups only, like A and B in the foregoing tables, without any subdivisions into sections. As an example of this system, it may be mentioned that in some districts these two divisions, or groups, are called Matturri and Karraroo;[1] in others they are Krokee and Kumite; in other parts they are called Kookoojiba and Koocheebinga, and, again in others, they are known as Koolpirry and Thinewah. In each case the men belonging to one primary division marry the women of the other, and the children take the name of their mother's division. As I am now engaged in the preparation of a comprehensive article dealing with this type of organization, I shall not enter farther upon it at present.

ON AN INTERESTING FRAGMENT OF THE "BOOK OF THE DEAD."

BY RUDOLPH BUTI, PH.D.

(Read May 5, 1899.)

In the Egyptian collection of the Woman's College of Baltimore there is an Egyptian hieratic papyrus which, when handed to me for translation, I found to be an interesting fragment of the "Book of the Dead." The fragment written on papyrus is a foot and an inch in length and seven inches in width.

It contains a part of the 149th chapter, which is divided into fourteen paragraphs. The papyrus is also divided into vertical columns of three inches, separated by a double line of nearly one-

---

[1] *Journ. Roy. Soc. N. S. Wales*, xxxii, 69.

Copper is, of the available materials, the best conductor and the cheapest. The price of aluminum, however, owing to the cheap power used in its manufacture, has fallen from five dollars per pound to twenty-five cents per pound. Pure aluminum, properly alloyed with a metal that will increase its strength without decreasing its conducting quality, renders it possible at the present time for aluminum conductors to be offered at exactly the same price per mile as copper, with the added advantage of allowing the poles supporting the line to be placed much farther apart, thus using fewer insulators and decreasing the cost of the line; also insuring more economy in transmission, as there is less leakage, due to the diminished number of supports, all of which will be weak points in the transmitting system. The increased area required for the lighter metal, resulting in a larger radiating surface, is favorable also to the dissipation of the heat engendered by the resistance in the line, as whatever energy is lost in such transmission assumes the form of heat energy.

What can this or any other learned Society do to help in the promotion of the knowledge of electricity applied to the use of man? It is a matter of great importance to those interested in the work of this Society that they recognize the necessity of exerting themselves to carry out the intent of its founder in promoting useful knowledge. We must try to induce the members and others to make use of the advantages that the Society possesses in disseminating useful knowledge through its publications, and to make this building and these rooms the place for the discussion of subjects of practical as well as theoretical importance in the same direction, on the lines so earnestly followed by its founder, who tried to bring together representative men of varied attainments and to have them submit papers for discussion.

In my efforts to interest members in our work in the direction of the subject of this discourse, and to have them submit papers for discussion, I have been met, first, with the excuse of want of time for the preparation of matter; second, the desire of most specialists to contribute to the societies devoted to their specialties; third, to the fact that there are so many periodicals for each special department of science ready and eager to obtain, even to pay for, copy, and in the case of electricity as applied to the service of man many of the professors of physics in colleges, specialists besides those on the staffs of the great manufacturing companies, are retained in the interest of such companies, and in some cases are even discouraged from making public what for a time can be used to advantage in a commercial way and classed among the trade secrets. I speak knowingly on this subject, for the first question that was asked me in 1889, before I was solicited to report on the subject of transmission of power by electricity, was whether I was retained in the interest of any electric company. The fact that patent litigation has played so important a part in the development of electricity is also to be taken into account when an effort is made to awaken debate on subjects that should be of special interest in the Society founded by the early electrician, Benjamin Franklin. Many men are loath to commit themselves in debate that may in a short time be taken hold of by patent attorneys. The commercial aspect of scientific advance is too important to be ignored; we must therefore, as members of the American Philosophical Society, as far as we can, induce others to assist in the work of the Society by showing a willingness to take an active part in the meetings that are held in this room, and by early publication of matter submitted give precedent in publication to those who lay claims to priority of discovery.

Stated Meeting, April 21, 1899.

Vice-President Sellers in the Chair.

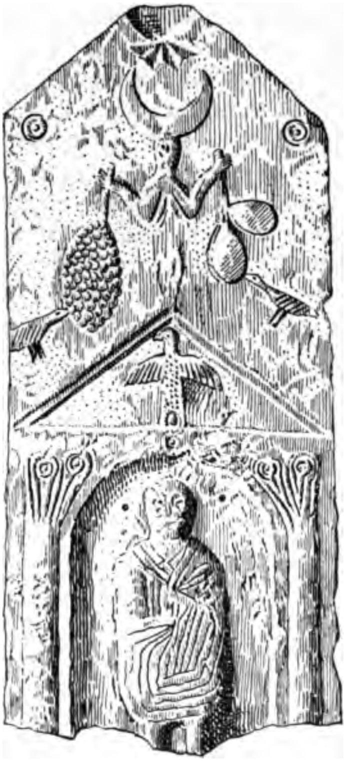
Present, 17 members.

The Curators announced that, in accordance with a resolution of the Society, the Carthaginian tombstone in its possession had been photographed, and exhibited a blue print of same (see accompanying figure, page 72).

The death of Sir Monier-Monier Williams, of London, England, April 11, 1899, who was elected a member December 17, 1886, was announced.

Dr. Stellwagen made a verbal communication to the Society in regard to a tombstone presented by Commodore Stellwagen, on behalf of Mr. Perry, which was brought from Carthage. He said:

It was in the spring of 1864, if my memory serves me correctly, that, at the urgent request of the Consul-General of the United States, Mr. Amos Perry, the U. S. S. "Constellation," of which I was an officer, paid a visit to the Bey of Tunis, as trouble with the Bedouins had caused alarm among the European residents.



Carthaginian Tombstone.

The Consul requested my father, Captain Henry S. Stellwagen, U. S. Navy, to bring two gravestones or stelæ to this country and send one each to scientific bodies in Philadelphia and New York. The one exhibited here this evening was first given into the care of the Academy of Natural Sciences, but afterwards, at the suggestion of an officer of that body, it was sent to the American Philosophical Society.

At the time of our visit the ruins of Carthage were so completely hidden by the overlying soil and fine débris that the localities of the famous city were but vaguely known. This stone stela was found in the region of the temple of Astarte, and by many of those who examined it the relief was considered to be a figure of the Goddess Astarte feeding carnivorous, and presumably sacred, animals with the entrails and genitals of the victim of a sacrifice.

I was discouraged at the very meagre results obtained by antiquarians who had studied the locality, and shocked to contemplate how entirely that great city was obliterated. Once she claimed to control the whole western Mediterranean Sea so effectually that "no one could wash his hands in it without her permission." Her fleets and armies, her agriculture and pomology, her stock raising and her temples are only known to us through her enemies, the Romans ; but these naturally biased historians freely acknowledged that she excelled the world. At the time of our visit only mounds of earth were to be seen there, covered with very small fragments of different-colored marbles, some fine large pieces of marble steps that evidently had formed portions of a great stairway to the sea gate, and a number of large subterranean reservoirs supposed to have been used for water storage, these being in pretty fair condition, and in strong contrast with the utter and absolute ruin of all else.

Which was followed by a verbal communication by Dr. Morris, as follows :

It has been said that Abdel Kader when brought as a prisoner to Paris was taken to Versailles and asked his opinion as to the celebrated paintings of the battles in Africa, where he had borne such an heroic part. He replied that "if an Arab had portrayed them he would probably have done so very differently." It is well for us to remember that nearly all we know of the Carthaginian empire, people or customs has come to us through Roman sources, and that the "Punica fides" which we have learned of in our childhood might seem very different if heard of from the other side. While I would not be considered as an apologist for the worship of Astarte, which we know of from Syrian and Phœnician as well as from Greek and Roman sources, passing as it does into that of Aphrodite and Nero, of Venus and Juno, or of sexual love, whether normal and pure or abnormal and illicit, it still remains true that

C'est toûjours l'amour, l'amour,
Qui fait le monde à la ronde.

Human nature has been and is the same in all climes, ages, civilizations and religions ; and it behooves us in inquiring about them to treat them fairly as we would seek to have done to our own views. It is in this manner I would study this relic, all too rare, as our friend, Dr. Thomas C. Stellwagen has just shown us, of Carthaginian civilization. It is a white sandstone slab, the lower part of which has been broken off and the upper corners sloped nearly but not quite to a point. It is 2 feet 5 inches

long, 1 foot 1¼ inches broad, and 5 inches thick. At the top is a ✱, which I take to be intended to represent the sun: on each of the corners of the sloping and straight sides two small concentric circles ⊙, which I take as intended to represent planets (Mars and Jupiter?): and on the upper part of the slab the figure of Astarte with its crescent, holding a pomegranate in the right hand, from which a beast is feasting, and in the left a bunch of dates plucked at by a bird. Under this figure of Astarte, thus emblematic of the love-passion as alike furnishing fertility and prosperity to all living beings, is the entablature of a temple or house with rude Corinthian columns, and an eagle, while beneath is the figure of a man calmly standing, wrapped in a robe. Herodianus (*circa* 150 A.D.) tells us of the custom prevailing at the beatification of an emperor among the Romans. An eagle was bound on the funeral pyre so that when it was lighted and the bonds burned the living bird soared aloft bearing the soul of the deceased to the empyrean, and the Imperator became Divus. May not this well explain this figure standing in the porch of the house or temple ready to pass through the region presided over by Love into the vast beyond where Light and Order still prevail? and how far would such a faith differ from that held by the most of us to-day?

This stone, I believe, formed the doorway of a vault or sarcophagus such as may be not infrequently found on or near the shores of the Mediterranean, and may well aid us in our inquiries into the real beliefs of those who passed so long ago into the Great Beyond.

On each side of the head of the man's figure is a small hole such as would receive a tenon on a bronze plaque, which may have covered this figure, as we see brasses on the graves of Crusaders in old cathedrals. If this were so, this monument, had it contained the man's name, would have, like Horace's, proved "Aere perennius."

The Society was adjourned by the presiding officer.

Stated Meeting, May 5, 1899.

Vice-President SELLERS in the Chair.

Present, 21 members.

Gen. Isaac J. Wistar read an obituary notice of the late Richard A. Tilghman.

The Secretaries announced the death at Philadelphia, on May 2, of Alexander Biddle, aged 80 years.

The following papers were read:

By Mr. R. H. Mathews, of Parramatta, New South Wales, "On Divisions of North Australian Tribes."

By Dr. Rudolph Buti, of Baltimore, "On an Interesting Fragment of the Book of the Dead."

By the Committee on Historical Manuscripts, "A Calendar of the Weedon and of the Richard Henry and Arthur Lee Correspondence in the Library of the Society."

Dr. Samuel G. Dixon was elected a Councillor to fill the unexpired term of Gen. Isaac J. Wistar, made vacant by his election as a Vice-President of the Society.

Mr. Harold Goodwin presented a framed engraving of John Vaughan, who had served the Society as Secretary in 1789 and 1790, as Treasurer from 1791 to 1841, and as Librarian from 1803 to 1842, and on motion the thanks of the Society were returned therefor.

The Society was adjourned by the presiding officer.

DIVISIONS OF NORTH AUSTRALIAN TRIBES.

BY R. H. MATHEWS, L.S.

(Read May 5, 1899.)

The division of a tribe into intermarrying sections or classes, although one of the most interesting of the institutions recognized among the Australian aborigines, has not hitherto received the attention which its importance deserves. In a former number of the PROCEEDINGS of this Society[1] I tabulated the names of eight sections, with the rules of marriage and descent in force over a large extent of country in the Northern Territory. Since then I have reported[2] a similar eight-section system, but with different sectional names, in the northwest corner of Queensland, extending southerly from the Gulf of Carpentaria for a distance of about three hundred miles, including the Wentworth, Nicholson, Gregory and Upper Georgina rivers.

In an article contributed to the Royal Society of New South Wales in June, 1898, I described the eight sections of the Arrinda tribe on the Finke, Todd and other rivers,[3] but, while that paper was in the press, a correspondent furnished me with additional information which shows the line of descent in a manner that is more readily understood than by the table appended to the article in question. I propose, therefore, to supply a new table, showing how the divisions intermarry, with the sections to which the offspring belong, as follows:

---

[1] PROC. AMER. PHILOS. SOC., xxxvii, 151–154.

[2] *Journ. Roy. Soc. N. S. Wales*, xxxii, 251, 252.

[3] *Ibid.*, xxxii, 72.

TABLE I.

		Husband	*Wife*	*Offspring*
GROUP A......	1.	Panungka	Parulla	Pungata
	2.	Mbutjana	Pungata	Ngala
	3.	Knurraia	Ngala	Bultara
	4.	Koomara	Bultara	Parulla
GROUP B......	5.	Parulla	Panungka	Koomara
	6.	Bultara	Koomara	Knurraia
	7.	Ngala	Knurraia	Mbutjana
	8.	Pungata	Mbutjana	Panungka

It will be observed by the foregoing table that the sons of the women of one group marry the daughters of the women of the other; and, also, that each group has perpetual succession through its females. For example, take the women of Group A in the table, we find that Parulla is the mother of Pungata; Pungata of Ngala; Ngala of Bultara, and Bultara is the mother of Parulla, and this order of succession is continually repeated.[1] Among the women of Group B the line of descent conforms to the same rules. I have traced some of the section names of this organization, namely, Bultara, Koomara, etc., across the country from the Upper Finke river northeasterly to the Georgina river, a distance of more than four hundred miles.

My correspondent also made some further investigations respecting the order of succession in four of the sections of the Warramonga tribe[2] at Tennant's Creek, with the result that it becomes necessary to prepare an amended table of one of the groups. As it might cause confusion to show only one group, I have included both in the subjoined table:

---

[1] The names of the eight sections of the Upper Finke river tribes were first reported by the Rev. L. Schulze in 1891 (*Trans. Roy. Soc. S. Australia*, xiv, 223, 224.) Their arrangement into two intermarrying gronps was the result of my investigations (*Journ. Roy. Soc. N. S. Wales*, xxxii, 72).

[2] *Journ. Roy. Soc. N. S. Wales*, xxxii, 73.

TABLE II.

	Husband	Wife	Offspring
GROUP A......	1. Aponunga	Tungulli	Apungata
	2. Ampajona	Apungata	Opalla
	3. Ungary	Opalla	Kabajee
	4. Akamarra	Kabajee	Tungulli
GROUP B......	5. Tungulli	Aponunga	Akamarra
	6. Kabajee	Akamarra	Ungary
	7. Opalla	Ungary	Ampajona
	8. Apungata	Ampajona	Aponunga

In Group A of the above table, the rotation of the section names is different from that given in my former table, which, necessarily, alters the order of descent among the women and children. Group B is the same as that previously given. If my correspondent is now correct, it can be shown by this table that a brother's son's children intermarry with a sister's son's children, instead of the son of a brother marrying the daughter of a sister, and *vice versa*, as stated in my former paper.[1] In examining the two tables, I and II, it is seen that the names of several sections in the Arrinda tribe are almost identical with some of the section names of the Warramonga.

On the McArthur, Kangaroo and Calvert rivers, in the Northern Territory, reaching thence along the shore of the Gulf of Carpentaria beyond the Queensland boundary, and extending inland about one hundred miles, are several native tribes, among which may be mentioned the Yuckamurri, Yanular, Leanawa, Yookala and Kurrawar. The following synopsis shows the section to which a man belongs—the section into which he can marry—and the designation of the offspring:

TABLE III.

	Husband	Wife	Offspring
GROUP A......	1. Joolanjegoo	Jungalagoo	Bullaranjee
	2. Jameragoo	Bullaranjee	Jooralagoo
	3. Jinagoo	Jooralagoo	Bungaranjee
	4. Yukamurra	Bungaranjee	Jungalagoo
GROUP B......	5. Jungalagoo	Joolanjegoo	Yukamurri
	6. Bungaranjee	Yukamurra	Jinagoo
	7. Jooralagoo	Jinagoo	Jameragoo
	8. Bullaranjee	Jameragoo	Joolanjegoo

---

[1] *Journ. Roy. Soc. N. S. Wales*, xxxii, 74.

Some native tribes on the Victoria river, in the Northern Territory of South Australia are segregated into two intermarrying groups, with the following subdivisions:

TABLE IV.

		Husband	*Wife*	*Offspring*
GROUP A......	1.	Jamada	Jungalla	Dhalyerree
	2.	Jameram	Dhalyerree	Joolam
	3.	Janna	Joolam	Dhungarree
	4.	Jummiunya	Dhungarree	Jungalla
GROUP B......	5.	Jungalla	Jamada	Jummiunya
	6.	Dhungarree	Jummiunya	Janna
	7.	Joolam	Janna	Jameram
	8.	Dhalyerree	Jameram	Jamada

If we compare Tables I, II, III and IV with the table of eight sections reported by me in a former article to this Society,[1] it will be observed that the four tables are constructed on the same system, and all contain the same order of succession. In other words, all the tribes dealt with have substantially the same organization, although there are dialectic variations, more or less, in the names of the sections. In the Tables I, II and III, I have omitted the feminine form of the name of each section, which, it is thought, will enable the reader more readily to follow the rules of marriage and descent. The divisional system, or social organization, reported in this article, extends from the Upper Finke river to the embouchure of the McArthur, in the Gulf of Carpentaria, a distance of about six hundred and fifty miles. I am informed by some of my correspondents that the same system, but with different divisional names, reaches westwardly from the Gulf of Carpentaria to the Daly and Victoria rivers, and onwards into West Australia.

The southern portion of the Arrinda and adjoining tribes occupy the Middle Finke and Charlotte waters, reaching as far south as the Macumba river. Among them there are only four sections employed to regulate the intersexual relations, as shown in the following table. These sections comprise four of those enumerated in Table I:

---

[1] PROC. AMER. PHILOS. SOC., xxxvii, 152.

TABLE V.

		Husband	*Wife*	*Offspring*
GROUP A......	1.	Panungka	Parulla	Bultara
	2.	Koomara	Bultara	Parulla
GROUP B......	3.	Parulla	Panungka	Koomara
	4.	Bultara	Koomara	Panungka

It will be seen that the community is segregated into two intermarrying groups, and that the children take the name of the complementary section in the division to which their mother belongs.

In the southern portion of South Australia there are a number of tribes who possess the two primary groups only, like A and B in the foregoing tables, without any subdivisions into sections. As an example of this system, it may be mentioned that in some districts these two divisions, or groups, are called Matturri and Karraroo;[1] in others they are Krokee and Kumite; in other parts they are called Kookoojiba and Koocheebinga, and, again in others, they are known as Koolpirry and Thinewah. In each case the men belonging to one primary division marry the women of the other, and the children take the name of their mother's division. As I am now engaged in the preparation of a comprehensive article dealing with this type of organization, I shall not enter farther upon it at present.

ON AN INTERESTING FRAGMENT OF THE "BOOK OF THE DEAD."

BY RUDOLPH BUTI, PH.D.

(Read May 5, 1899.)

In the Egyptian collection of the Woman's College of Baltimore there is an Egyptian hieratic papyrus which, when handed to me for translation, I found to be an interesting fragment of the "Book of the Dead." The fragment written on papyrus is a foot and an inch in length and seven inches in width.

It contains a part of the 149th chapter, which is divided into fourteen paragraphs. The papyrus is also divided into vertical columns of three inches, separated by a double line of nearly one-eighth of an inch. The top of each column is occupied for two and one-half inches by colored vignettes, relating to the subject of the paragraph.

---

[1] *Journ. Roy. Soc. N. S. Wales*, xxxii, 69.

The 149th chapter, to which the fragment belongs, is one of the highly mystical chapters, and, with the 148th, was to be recited on the festivals of the first, sixth and fifteenth days of the month, in order to let the deceased pass the mystical regions of Akar (a kind of Purgatory?) and to allow the soul to come out of them.

The entire 149th chapter contained fourteen parts or "abodes" ot the Hades. In this papyrus we have the eleventh, twelfth, thirteenth and a portion of the fourteenth or last: but even the first three are not complete.

Almost all the vignettes have demons with swords in their hands. The first vignette (eleventh abode) contains a zigzag path, which is not a staircase as it appears for want of perspective, and two demons. One of them is female and lion-headed, with two swords; the other is male, a Cynocephalus God, also with two swords.

The following vignette (twelfth abode) contains a hippopotamus demon with axe-blade containing four swords.

The thirteenth abode contains the goddess Thaur or Thoueris, a concubine of Typho, the evil genius *Sĕpu*, with the features of hippopotamus and holding a scarabæus.

In the papyrus of Turin there is also a bareheaded god with bow and arrows; in its place are three horse-shoe-shaped abodes.

The last vignette is very much mutilated, but, with the help of the other rituals, we can reconstruct it. We have a crocodile, a hawk and an antropo-sphinx anubis, a Shes or tie God adoring, hawk again, befaced demon with swords, nit and horns.

According to the very regular writing of hieratic text, the colors of vignettes and the differences from other texts, we can say that this fragment belongs to the twenty-first dynasty, like one of those extracts made for religious purposes, preserved in the temples in order to be recited on the festivals of Uka or Thoth, the birthday of Osiris, the manifestations of Khem and the night of the hakr.

The first line of each column, containing the title of the paragraph, is written in red ink, all the others in black.

Although there are seventy-eight fragments of the "Book of the Dead" (of which twenty-five only in England and seventeen in

Paris), the Baltimore fragment is one of the few in America, and it is interesting on account of its fine handwriting and its completeness in the titles of different columns or paragraphs.

Besides that, in our fragment there are some variants worthy of note.

In the beginning of the eleventh abode we find a mention of "Osiris, Lord of Tattou" (Ȧusar neb Tattu . . .), which is never seen in the other texts.

All the phrases which in the Naville complete edition are erased are here clearly legible; even in the beginning of the twelfth abode, when in this fragment is written, "Osiris who opens the doors of heaven" (Ȧusar un āā pet . . .); in all other fragments this phrase is always wanting.

Equally, in the beginning of the last or fourteenth abode, the phrase, "Ammon in Thebes" (⊥men em Ȧptet), is not to be found in any other edition.

CALENDAR OF THE CORRESPONDENCE OF BRIGADIER-GENERAL GEORGE WEEDON, U. S. A., WITH CELEBRATED CHARACTERS OF THE AMERICAN REVOLUTION.

In the Library of the American Philosophical Society.

Prepared under the direction of the Committee on Historical Manuscripts.

(Read May 5, 1899.)

LETTERS TO GENERAL WEEDON.

Blair, Archibald:

1780.– *September 6. In Council.*—Proposition from Col. Robert Lawson to raise a body of volunteers to march to the southward, accepted. Detailed enumeration of conditions under which they shall serve. (Copy) No. 40.

1781.—*April 4. In Council.*—Extract from the minutes. Rule of exchange of prisoners to be adhered to as far as possible, calling for such citizens first as have been longest in captivity. If enemy think proper to liberate *absolutely* any number of captive citizens, an equal number of theirs shall be liberated. No. 75.

BLAND, THEODORICK:

1783.—*March 25. Philadelphia.*—Rejoicing over the declaration of peace. Our debt of gratitude to France.

P. S.—Commutation of five years' whole pay in lieu of half pay, allowed by Congress to officers of the army. No. 145.

DAVIS, WILLIAM:

1781.—*June 25. War Office.*—Wishes to know if arms sent arrived at Fredericksburg. Desires his assistance in getting boats for the Marquis, and also in meeting his demand for 600 arms. Dimensions and cost of boats. Congratulates him on the capture of Augusta with 160 British, 200 Tories and about 200 negroes, six pieces of cannon and various stores. On the 8th inst., Gen. Greene's approaches were within 50 yards of the enemy's works at Ninety-six. Offer of capitulation rejected. Reinforcements from Augusta hourly expected to join Gen. Greene. Enemy's only posts, Charlestown, Savannah and Monk's Corner. Georgetown evacuated. Will be in Charlottesville before he can receive an answer. No. 137.

DESBIGUES:

1781.—*June 6. Falmouth (in French).*—Asking for a permit to cross the river. Intends to debark at Leedstown for Cadiz to command the volunteers. No. 109.

ELWELL, JESSE:

1781.—*June 13. Prince William.*—Received orders from Gen. Nelson to send to camp every man of the militia who can be furnished with a rifle, and all horses except those employed in agriculture. Desires advice as to the carrying out of these orders. No. 121.

GRAHAM, RICHARD:

1781.—*June 14. Dumfries.*—Concerning the making of swords or sword hilts. Mr. Caves' offer to make 50 hilts if paid for them in tobacco. Desires his opinion on the intended movements of Cornwallis. No. 122.

GRAYSON, WILLIAM (Col.):

1780.—*October 23. Philadelphia.*—Encloses newspapers. Letter from Mr. Richard Harrison, at Cadiz, mentions destruction of

GRAYSON, WILLIAM (*continued*):

an English fleet of merchantmen. Col. Febiger's zeal in procuring clothes and tents attended with only moderate success. Afraid army will be distressed for woollen clothing and blankets. Will squeeze out about 500 suits for the Virginia line. Blames Virginia for not properly clothing her troops.

N. B.—Gen. Greene to command to the southward. Parsons promoted to rank as Major-General. Heath commands at West Point. No. 45.

1781.—*April 24. War Office.*—Warning him of the reported embarkation of Gen. Clinton for the southward with 3000 men. Believes they meditate immediate descent on Virginia to coöperate with Cornwallis for the conquest of that State and North Carolina. Has private intelligence that French fleet destined for America has not yet sailed. Wayne to set out in a day or two. Scarcity of cash the reason for his delay. Maryland dragoons in want of everything. Dutch have closed with Great Britain as to hostilities. Major Anderson of Virginia and several other officers exchanged by Gen. Moultrie. Cornwallis' threat to send all American officers to Jamaica.

P.S.—In future will not sign his name to any letter, as the British make a point of seizing post-riders and publishing the letters. No. 86.

1781.—*May 29. Philadelphia.*—Detailed account of arms ready to be sent on, and those in preparation. No money in Virginia to buy anything, and no credit. Wayne on his way to Fredericksburg. Six hundred new levies expected from Maryland and Delaware. With Moylan's horse and Steuben's 1200 cannot Cornwallis be faced? Evacuation of New York not so improbable. Conjectures concerning the destination of the last detachments from New York. Advices from Europe most hopeful. No. 95.

1781.—*June 5. Philadelphia.*—Desires more particular intelligence concerning the Marquis' whereabouts, and the number of his (Gen. Weedon's) own force. By July 1, there will be sufficient arms in Virginia for every purpose. Three battalions of militia ordered from Maryland and four from Pennsylvania. Incloses list of arms sent on. Will send by every post further

GRAYSON, WILLIAM (*continued*):

details. Will push hard to get leave to go to Virginia, after arranging matter of arms. No. 106.

1781.—*June 5*. *Philadelphia.*—Asking that an officer may be sent to Noland's Ferry, who shall remain until July 1, to direct the waggoners where to take the arms. No. 108.

1781.—*June 12*. *Philadelphia.* — Acknowledging letter of 5th inst. List of arms sent. Upwards of 200 muskets repaired daily. Swords and pistols not so numerous, but promises a certain number. Has informed the Marquis of these matters and has suggested the propriety of collecting and stationing a body of volunteers at Leesburgh. Heard that the Duc de Lauzun's corps were at Lebanon, but uncertain whether their destination is Virginia. Advises skirmishes, but no general action. No. 120.

1781.—*June 18*. *Philadelphia.*—Acknowledging letter, and glad to hear that matters are not so desperate. Fears the Marquis will risk a battle. Great superiority of the enemy's cavalry. Mentions various reinforcements if only the Marquis will wait for them. Assembly of Pennsylvania doing nothing, still debating the advisability of sending troops to Virginia's aid. Convulsed by faction and ruled by Republican party. President of the State desires the measure, and also the command of the troops, if they march. News of arrival of ships at Boston containing 1200 recruits and military stores for French army at Rhode Island. Also news too good to be true of the arrival in Boston of the Alliance and Lafayette with food and clothing. Difficulty in getting waggoners to carry the arms, several of them having been taken by the enemy. No. 129.

1781.—*June 26*. *Philadelphia.*—Clothing and 200,000 cartridges despatched to the Marquis, also arms, which were repaired. Moylan will leave Lancaster in two days with 60 dragoons well accoutred. Arrival of Capt. Barry at Boston in the Alliance. Parted, at sea in a gale, with the Lafayette, containing all the arms and clothing. Safety of this vessel of more importance than three victories. Pennsylvania doing well. Reasons for thinking Gen. Weedon ought not to join the Marquis. Desires his opinion of rampart arms. List of arms ordered. No. 140.

GREENE, NATHANAEL (Gen.):

1777.—*February 24. Basking Ridge, N. Y.*—Acknowledging letter of 23d inst. Ignorant who gave Col. Guyger orders to come to his department, but will arm them. Col. Piper's detachment to join Gen. Putnam. Attack made on foraging party of enemy, from Amboy, 4000 strong. Enumerates casualties on both sides. Col. Johnson, with party of Maryland militia, attacked enemy, but, just as they were in his power, his party cowardly deserted him. Will send prisoners, taken by Gen. Warner, to Morristown.

N. B.—Enemy killed two of the inhabitants because they did not assist them to carry off their dead. No. 2.

1782.—*April 22. Headquarters near Dorchester.*—First part of letter personal and amusing. In latter part, speaks of ragged and destitute condition of the army. Complaints of officers and men. Not a good condition in which to face a superior enemy. Not a drop of spirits in camp. No. 142.

1782.—*October 1. Headquarters.*—Congratulations on the approaching peace. Evacuation of Savannah and Charleston, old news. Refugees embarking for St. Augustine—no greater punishment. Their situation there deplorable: no shelter, no food. Resentment of people too strong to admit pity. Expects whole British army to be gone by the 12th or 15th. His work being completed, hopes to go North. Took pride in getting rid of enemy without foreign aid. Prospects flattering, but vigilance still needed. Meeting of officers to be held in January to learn their wishes in respect to returning from, or continuing in, service. For himself, desires, above everything, to be a private citizen. Particulars about Col. Washington's and Lt. Col. Lee's marriage. Remembrances to friends. No. 143.

HENDRICKS, JAMES (Col.):

1781.—*May 15.—Alexandria.*—Reporting unnecessary delay in the carrying of a letter from the Marquis to Gen. Wayne. Desires the matter to be looked into and the delinquent punished. No. 93.

1781.—*June 19. Alexandria.*—Acknowledging letter of 17th inst. Capt. Moore, commanding Volunteer Light Horse at

HENDRICKS, JAMES (*continued*):

Georgetown, does not think he is justified in moving without the Governor's instructions. Such punctilios a pity. Hears the Executive of Maryland has never been called on, officially, for her aid; if true, wishes the Marquis would call on them. Can find no shoes in town. Must get County Commissioner's assistance to procure vinegar and spirits. Will do all in his power. No. 133.

HOLMES, JOSEPH:

1781.—*June 5. Winchester.*—Acknowledging letter of 2d inst., concerning the guarding of prisoners. Renders account of the prisoners, their number and rank. No. 105.

JEFFERSON, THOMAS:

No date.—Executive will impress necessary boats. Light boats being built but not to be depended on. No. 30.

1780.—*July 28. Richmond.*—Asks for duplicate certificates, setting forth at what time the regiments were taken on the Continental establishment, whether armed by the State, and how many arms they carried. No. 32.

1780.—*October 22. Richmond.*—Received this day certain information of the arrival of a considerable fleet of the enemy in the bay, and of their intended debarkation. Measures taken to oppose them. His (Gen. Weedon's) presence needed to aid in the command, also Gen. Muhlenberg's, Gen. Nelson's and Gen. Stevan's. No. 43.

1780.—*November 3. Richmond.*—State of magazine renders it essential that not a single arm shall be lost. No militia man who has received a public arm shall be discharged from duty until he has returned it, or given a satisfactory account of it. If he omits to do this, he shall be declared a deserter. No. 52.

1780.—*November 6. In Council.*—Every kind of necessary in future to be impressed according to the directions of the invasion law. One hundred copies of this clause to be printed. The State Quartermaster directed to spare to Mr. Southall two of the three wagons he has. Question as to who has the right of appointing the surgeon and the surgeon's mate. Encloses £125 new money, only kind issued from the treasury, equal to

JEFFERSON, THOMAS (*continued*):

£5000 old money. Offers any aid in their power to promote operations in the laboratory. No. 55.

1780.—*November 7*. *In Council*.—Encloses Militia Commission to Mr. Triplett, to enable him legally to impress provisions and necessaries. No. 56.

1781.—*March 31*. *In Council*.—Statement of the number of militia needed to relieve those first called upon. Discusses speediest way of obtaining reinforcements. Master Alexander Frazier Gregory to be permitted to land and proceed to Urbana, on account of services rendered Gen. Woodford by his father. Encloses letters to be delivered to the Flag vessel in James river. No. 64.

1781.—*April 3*. *In Council*.—Desiring him to see that the militia, ordered to relieve those long in service, proceed to Gen. Muhlenberg's headquarters. Part of Gen. Muhlenberg's forces, having been three months from home, are very impatient. Thinks it wise not to hazard his (Weedon's) detachments more than is necessary. Scouring parties still keep up spirits of the people, protect them from depredation, and, if withdrawn of nights, will, perhaps, be safe. Disposition of vessels containing stores.

P. S.—Very particular attention to be paid to the returning of public arms and ammunition. No. 72.

1781.—*April 4*. *In Council*.—Acknowledging letters of 1st, 2d, 3d inst. Impossible to send additional arms at present. Any men from the counties destined for the present tour, who cannot be armed, may be sent to Gen. Muhlenberg, whose riflemen will not stay until reliefs arrive. Encloses resolution of Council concerning exchange of prisoners under general rules, the advantage of which will result equally to the lowest and highest citizen. Right of turn an insuperable obstacle to every proposition for the exchange of Col. Curle. Desires Col. Curle's enlargement may be obtained on such a parole as a man of honor could sign. Our kindness to captive English officers should render refusal difficult. Encloses list of prisoners for exchange, soldier for soldier, sailor for sailor, etc. No. 73.

JEFFERSON, THOMAS (*continued*):

1781.—*April 23. Richmond.*—Inclosing letter forwarded by Baron Steuben. Anxious to know if it is an answer to proposition for exchange of prisoners. On 18th enemy came from Portsmouth up James river, force unknown. Landed in two bodies; one at Burwell's Ferry, the other near the mouth of Chickahominy river. Upper party proceeded to shipyard. What injury they did unknown. Stores eight or ten miles higher up. On 22d, enemy left Williamsburg; their future movements doubtful. Enumerates counties from which all men able to bear arms are ordered to assemble at Petersburg. No. 85.

JENIFER, DANIEL, OF ST. THOMAS:

1781.—*June 5. Philadelphia.* — Meeting of foreign powers. Thinks France will procure us favorable terms, if not from justice then from policy. Trusts the Marquis will check Cornwallis. Grayson indefatigable in procuring arms. Four battalions likely to be sent at once to the aid of Maryland or Virginia. Advantage to Pennsylvania if she had delayed a little longer the selling of British property. No. 107.

JONES, JAMES:

1781.—*June 17. Bowling Green.*—Announcing his advance to join the Marquis with a troop of volunteer horse raised in Gloucester county. Ignorance of the enemy's whereabouts and terrible condition of his horse's hoofs determined his march to Fredericksburg. No. 125.

LAFAYETTE, MARQUIS DE:

1781.—*April 27. Bowling Green.*—From information received, thinks enemy has landed, near 3000 strong, and taken Petersburg. Intends leaving for Richmond on the following morning. Small force of horse or men necessary to the Governor's safety and his own in Richmond. Arrival of artillery under Galvan of the utmost importance. Requests him to give Galvan any militia and mounted men he can collect. Must be pushed on night and day. Importance of keeping Richmond. No. 92.

1781.—*May 28. Hanover county.* — Public stores and much private property having been removed from Richmond. A

LAFAYETTE, MARQUIS DE (*continued*):

defeat at present is not worth risking. Road from Hanover Court house to Richmond being unsafe, will remove to Allen's Ford, south of Anne river. Requests that the militia and the expresses shall be ordered to that ford. Also that a strong force may convey thither the horses, arms and particularly clothing coming from Baltimore and Philadelphia. Enclosed to be forwarded to Gen. Wayne. Leslie reported to have gone down James river to garrison Portsmouth. Wants riflemen, cavalry and arms. Thanks him for his past exertions. No. 94.

1781.—*May 29. Gold Mine Creek.*—Enemy's present plan to march to Fredericksburg; hopes to arrive before the main body. Will be at Anderson bridge the following day at noon. Desires everything to be sent there. Desperate need for dragoons. Enclosed to be sent post-haste to Gen. Wayne. All stores to be moved out of harm's way. Every boat and bridge below the falls to be immediately destroyed. The great want of horses and saddles. Desires him to acquaint the General's mother and also Mrs. Washington with this news, also any others who mean to move. No. 96.

1781.—*June 2. Davenport Tavern.*—Enemy's intention to turn his right flank and prevent his junction with Gen. Wayne. Will move towards Orange Court house, at which place militia must rendezvous, and expresses be sent there. Orders concerning supplies on hand and those on the road.

P. S.—Even bet that the enemy will go straight to Fredericksburg. Leslie and Arnold gone down already with body of troops. No. 99.

1781.—*June 2. Mattapony Church.*—(Written by G. A. Washington, aide-de-camp of LaFayette.) Removal of public stores should proceed. Precautions for his (Gen. Weedon's) safety must be taken, as the main body of the enemy are at Chesterfield, and will probably be in Fredericksburg on the following day. Begs him to acquaint Gen. Wayne with the situation, and to write the commissary of prisons, to hold prisoners in Winchester ready at a moment's warning. On arrival of enemy, destruction of boats must be particularly attended to. No. 100.

LAFAYETTE, MARQUIS DE (*continued*):

1781.—*June 3. Corbin's Bridge.*—Orders concerning the sending forward of the militia, the mails and the stores. No. 103.

1781.—*June 16. Deep Creek.*—Mr. Brown is the bearer of this letter. Enemy moving towards Richmond, followed by him (LaFayette), but difference of ground makes reinforcements an immediate necessity. Desires above all things, cavalry. Directions as to their reaching him at once. Wants all armed and unarmed militia, not belonging to counties north of Rappahannock, to be hurried on to him with the greatest despatch. The terrible need of cartridges and shoes, also rum, for the water is bad. Importance of these things! They must travel night and day. No. 123.

LEE, RICHARD HENRY:

1781.—*June 1.*—Acknowledging letter of previous day concerning the raising of militia in the four lower countries. Westmoreland Court house an excellent rendezvous. Certain that Cornwallis will not come north until English fleet appears in the Potomac. Conjectures concerning the slowness of their advance. Terrible want of all things: arms, cavalry, ammunition, etc. Trusts Gen. Wayne will join him (the Marquis) in a day or two, and that together they will make head against the enemy's divided force. No. 97.

1781.—*June 2. 9 o'clock, Saturday.*—Acknowledging letter of previous day. Will submit it to the Lieutenant of Richmond to be forwarded. Will call out militia and armed men to the number of 200 or 250. Enemy's councils now directed by plunder and revenge. No. 98.

1781.—*June 7.*—Detailed account of the drafting of militia. Two hundred well-armed men will join him at Falmouth, under command of Col. John A. Washington. May expect 500 men from the four lower counties. Enemy's designs in the Rappahannock and Potomac. Fears they cannot be prevented from plundering and burning, since so many men and officers have been detached. Will deliver his letter to Col. Warrington. No. 110.

1781.—*June 25. Westmoreland.*—Informing him that one-half of the Westmoreland militia are ordered to march on the following day. Recommends the bearer, Mr. John Munroe, to his

LEE, RICHARD HENRY (*continued*):

kind attention and begs his influence in procuring him a position in the army, more worthy of his past service. No. 139.

1781.—*July 1. Chantilly.*—Acknowledging his last letter. Lookouts vigilant and on the alert for any sign of hostile fleet. Enclosed letter from the Marquis tells condition of affairs three days before. Reported that Mr. Jenifer of Congress has written to his brother of the evacuation of New York by the enemy. If true, either the southern war will be pushed vigorously, or else they intend to quit the states. Wants powder, cartridge paper and a few arms. No. 147.

MCHENRY, JAMES:

1781.—*June 25. Mr. Savage's House.*—Enemy lay at New Kent Courthouse, from 21st to 24th. This morning, Pennsylvanians moved on the route of his lordship. Militia continue on this ground. Marquis begs that a special messenger be despatched to Annapolis to the officer commanding Moylan's corps. No. 138.

1781.—*June 29. Tyree's Plantation, Twenty Miles from Williamsburg.*—Short account of an action on the 26th between American advanced corps under Cols. Butler and Simcoe, within six miles of Williamsburg. American loss: five officers, two sergeants and twenty-six privates killed and wounded. Enemy had sixty killed and one hundred wounded. Lord Cornwallis in Williamsburg; has received reinforcements from Portsmouth; is shipping off his negroes at York. No. 141.

MCWILLIAMS, WILLIAM:

1781.—*June 20. Camp, Dandridge's Farm.*—Glad to place certain men in the important business of making accoutrements for the soldiery. Gen. Greene's success in Carolina. All the enemy's posts taken, except Charlestown, besides 20,000 bushels of corn, sixteen pieces of cannon, and 500 British prisoners. Enemy have crossed James river at Richmond, after destroying tobacco warehouses and some private property. Apologizes for any inaccuracy on the plea of the scarcity of paper. No. 135.

MEALS, JOHN:

1780.—*October 30. Long Island.*—Bearer of this letter is Capt. Willis, who has been exchanged. Speaks of himself as a prisoner with small hope of liberation. Solicits Gen. Weedon's influence with those in power to procure him a parole. Question of certain rents being due. No. 17.

MERCER, JOHN F.:

1783.—*March 24. Philadelphia.*—Negotiations in Europe happily terminated in a general pacification. Triumph, a French frigate, despatched by LaFayette and Comte d' Estaing, brought the news of the cessation of hostilities. Late confusion in the army terminated in a manner which reflects additional honor on that band of patriots. Results of a slight alteration in the southern boundary. No. 144.

MORTIMER, CHARLES:

1780.—*October 30. Fredericksburg.*—Has sent one hundred weight bark, as requested. Urgent need of medicines for his hospital. Keeps the few medicines he has for private practice. Has sent forward seven or eight patients. None shall be kept that can do duty in field or garrison. No. 18.

MUHLENBERG, GENERAL:

1780.—*September 5. Fredericksburg.*—Wishes to know whether it would not be wiser to keep sufficient arms for the levies that rendezvous at Winchester, Alexandria and Fredericksburg. Encloses returns of arms sent forward and those left behind. As soon as he can make up an officer's command with the deserters brought in, will attend to Gen. Weedon's letter of the 29th inst. No. 39.

1780.—*October 8. Richmond.*—Express arrived an hour before from Gen. Gates with an account that Lord Cornwallis had been reinforced with 1000 men, that the enemy were in motion and had taken Charlotte. Begs for four wagons to enable him to send reinforcements to the General. No. 42.

1780.—*October 22. Richmond.*—Sunday night. Amazingly distressed for want of officers. Wishes every officer from Fredericksburg sent on, also Dr. Wallace, as he needs a surgeon. No. 44.

MUHLENBERG, GEN. (*continued*):

1780.—*October 27. Petersburg.*—Glad to hear of his (Weedon's) arrival at Richmond. Advice as to the arrangement of the new levies. Col. Bufort's letter reports that Col. Campbell, in a late action with part of Fulton's corps, killed seventy of them. Making preparations to march for Cabbin Point. Has ordered London Volunteers to join ninety of Gibson's Regiment. No. 47.

1780.—*October 28. Cabbin Point.*—Arrived at Cabbin Point this morning. Nettled to hear that the English had reimbarked and hauled off into the bay without having a shot fired at them. A British cavalryman, captured, swears he left British troops, two nights before, marching towards Smithfield, and that the forces employed in this invasion number 8000. Believes he lies, but will march the next morning and convince himself. What can he do without cavalry or cannon? Has 140 men without camp-kettles; also companies of 100 men with only one officer. No. 49.

1780.—*October 29. Cabbin Point.*—Favor of 27th at hand. Prisoner's assertions of yesterday confirmed. Enemy about eight miles from Smithfield. Would be there, himself, if he could have procured provisions. Money necessary to get military departments in order.

P. S.—Hears that enemy encamped two nights before at Joseph Scott's, seven miles above Suffolk. No. 50.

1780.—*October 31. Baker's Mills, Isle of Wight.*—Militia, 100 in number, assembled at Cabbin Point, only four muskets among them. Must refer them to him (Weedon) for arms. Has sent out 300 men after a plundering party. Hopes to gain from them a few prisoners to furnish him with proper intelligence. Expects Gen. Nelson in the evening. No. 20.

1780.—*October 31. Col. Allen Cockes.*—The bearer of this, Mr. Bush, can give all the intelligence procured thus far. If possible, will form a junction with Col. Parker, before night, who has 250 men. Will endeavor to surprise enemy's outposts. In great need of horse for reconnoitering purposes. No. 22.

1780.—*November 5.*—Encloses letter for the Governor. Reinforcements received, so trifling that he is obliged to stand aloof and not venture further. Difficulties of his position, the enemy

MUHLENBERG, GEN. (*continued*):
having destroyed all boats. Force of enemy too large to permit of his attacking them. Capt. Gaines with small body of horse surprised the advance picket. Officer of the guard, a Hessian, lost his life through speaking English imperfectly. Any chance of getting arms for militia?

P. S.—Twenty-two bushels of oysters just arrived. No. 51.

1780.—*November 5. Stoners Mills.*—Since writing has received enclosed letters from Gen. Gregory and Col. Lamb. Enemy's present manœuvres make reinforcements at this post absolutely necessary. Advises Gen. Weedon if he moves down to take the nearest route to Stoners Mills. Flag just got to Smithfield from Portsmouth, with letter from Mr. Blair on a very frivolous errand. Intends writing to Gen. Leslie to send flag only when there is something worth communicating. [No. 54.

1780.—*November 11. Stoners Mills.*—Just received his favor by express; glad to hear that he is coming on. Enemy lie still from choice, while he does it from necessity. Has a plan to surprise the enemy's post at Dr. Hall's, but will put it off until Gen. Weedon's arrival. Ship-carpenters not needed at his post. Expects Gen. Weedon and Gen. Nelson to supper Monday evening, "hail, rain or snow." No. 58.

1781.—*April 6. Camp near Scott's.*—Acknowledging letter of the 4th. Sent Gen. Phillips's letter, regarding exchange of prisoners, to the Baron. Enemy's designs uncertain. Thinks their main object a junction with Cornwallis, by which route time only will discover. Two deserters from Portsmouth insist that Gen. Phillips has only two regiments. Advantages of his own position; description of the distribution of his forces. No. 77.

1784.—*February 15. Philadelphia.*—Acknowledging favors of 10th and 18th of January. Never received letter enclosing Act of Assembly. Inconvenience of having to set out at once at such short notice for the meeting at Louisville. Instructions concerning personal money matters in case he fails to return from this expedition. Laments the selling of Gen. Weedon's lands and the consequent end of their fishing together. The effect on Mrs. Muhlenberg. Would like to send by post some new books, but it costs too much. Baron Steuben hard at work. No. 150.

MUHLENBERG, GEN. (*continued*):

1786.—*July 18*. *Philadelphia.*—Delay in getting letter of May 29th. Prize money cannot be drawn unless tickets are presented. Sends bundle of newspapers and the anniversary oration, delivered by Major Jackson before the Society of Cincinnati. The purchase by him and the vice-president of the famous Big Spring tract in Berks Co., Pennsylvania. A description of its advantages. (Note on back of MSS., dated October 12.) Speaks of letter on other side, dated three months before. No time since to write. No. 151.

NELSON, THOMAS.

1777.—*October 28*. *Williamsburg.*—Wishes to know if report is true that Burgoyne has really surrendered. If true, will not independence be immediately established? Attack on Fort Mifflin, having failed again, their momentary possession of Philadelphia will avail them little. His (Nelson's) sympathy with the army, but his strong wish to raise a body of men, not thought proper at this time. Promises to do it in the future. The Assembly appointed to meet nine days before, has not yet made a House. Terrible remissness at such a critical time. Fears the enemy will hear of it. Nine ships of war in Hampton Roads; their object, perhaps, an attack on Portsmouth. Enemy in want of water. Trusts they will not be able to relieve their distress in Virginia. No. 7.

1777.—*December 19*. *Williamsburg.*—Acknowledging favor of 27th inst. Letters from York report that Gen. Howe has marched to Chestnut Hill with entire force and an engagement hourly expected. Wishes a general battle could be avoided. Condition of our men compares unfavorably with the enemy's. Also, a defeat on our side might prevent France from declaring war on England. Bill, brought into the House by him, to raise 5000 men to serve six months, thrown out. Might interfere with completing the regular battalions. No. 10.

1780.—*November 3*. *Williamsburg.*—Acknowledging letters delivered by Captains Prosser and Kirkpatrick. Difficulty of arranging militia when they arrive in such small detachments. One regiment under Col. William Nelson will take their station below York; he needs a Lieut.-Colonel and a Major. Will form light corps for Captain Kirkpatrick as requested.

NELSON, THOMAS (*continued*):

Getting together flat-bottomed boats. In great need of arms, also of men to repair them. Enemy prevented his crossing the river to meet Muhlenberg. No. 29.

1780.—*November 4. Williamsburg.*—Orders just issued to bring boats at the shipyard to Burwell's Ferry. Before receiving his letter of 2d inst., had sent two detachments of horse to Gen. Muhlenberg, and a third will follow. Col. Southall with part of his troops is around Hampton, sent thither as a man of discretion to prevent any intercourse between the enemy and the inhabitants. Thinks he ought to stay there, but, if necessary, will send him to join Gen. Muhlenberg. Medicine needed. No. 53.

1780.—*November 22. Rich Neck.*—Acknowledging letter of the 19th. Does not understand why English fleet remains in Hampton Roads. They have an idea that his (Nelson's) force is 3000 strong. Several negroes have joined the English. Prospect of a glorious ending to the campaign. Detached condition of his brigade. No. 59.

1781.—*June 18. Leeds.*—Informing him that he has sent up six prisoners under guard. Incloses proceedings of a general court-martial held for their trial. Necessity of guarding them closely. Incloses also general return and copy of circular letter to the county-lieutenants of Northumberland and Lancaster, on back of which is a copy of orders to the officers commanding two companies for the defence of Westmoreland and Richmond. His present command the most pleasant in all his military experience. Forming legions of Westmoreland and Richmond, in order to furlough the rest of his command. Question of cavalry. No. 131.

1781.—*June 19. Leeds.*—Concerning the trial of some "vile rascals." Happy effects produced by this tribunal. When it is over will send prisoners under guard to him to be forwarded to their respective destinations with statements of their crimes and the sentence of the court martial. More about the granting of furloughs. Begs permission to go and assist his family who are without food, raiment or lodging. Complains of never receiving a line from any militia officer. Houses burned by enemy. Robberies committed by enemy's privateers since

NELSON, THOMAS (*continued*):

the flag vessel went up to Alexandria; this matter ought to be looked into. No. 132.

1781.—*July 2. Charlottesville.*—Indisposition prevented his answering despatches before. Thanks him for his vigilance and activity in apprehending tories on the borders of the Rappahannock. Desires some intelligence respecting the disaffected. Montague's being tried by a court-martial may bring matters to light. Other measures which might be taken. No. 148.

PAGE, MANN:

1777.—*April 22. Philadelphia.*—Mrs. Page's illness prevented an earlier reply. Best Generals think the enemy's principal attack will be against this place. On Sunday, 13th inst, nine of their men-of-war came into this bay. Camp ordered by Congress to be formed under Gen. Schuyler on west side of Delaware. Enumerates the reasons for it. Gen. Washington approves in part, and ordered camp to be formed at Bristol. Enemy anxious to obstruct trade of Philadelphia. Their army mouldering away with sickness. On 14th Gen. Steven surprised enemy's pickets, killed seven and took sixteen prisoners.

P.S.—Surgeon has gone to Dumfries to inoculate southern troops. No. 4.

PARKER, (Col.):

1777.—*January 24. Springfield.*—Detailed account of a fight on the road leading from Brunswick landing to Woodbridge. Col. Parker's superior officer, Col. Buckner, left on horseback as soon as firing began, and riding four miles to his quarters, announced that all was lost. By this desertion Col. Parker was forced to draw off his troops, none being wounded and only two taken. English loss nearly one hundred killed and wounded. Charges Col. Buckner with cowardice. No. 1.

PRYOR, MAJOR:

1781.—*April 9. Richmond.*—Agreeable to request, has procured a proper vessel as a floating magazine, to be stationed at Sandy Point. Promises shortly to supply a sufficient quantity of ammunition. No. 82.

STEUBEN, BARON:

1780.—*November 23. Richmond.*—His letter of the 19th to Gen. Greene, arriving too late, was delivered to him (Steuben). Desires to see Gen. Weedon and have his advice and assistance in arranging the military department. No. 60.

1781.—*March 21. Suffolk.*—Instructions to march with the troops under his command to York, to cover the battery at that place. Troops at Halfway House to remain there. All boats collected in College Creek to go immediately into Chickahominy river. Vessels to go as high up James river as possible. No. 62.

1781.—*April 1. Chesterfield.*—Rejection of his proposals by the Government. Prospect of accelerating departure of new levies by no means flattering. Gen. Greene very pressing to have cavalry completed; at a loss how it's to be done. Had enemy chosen to disembark all their forces, and make a descent on north side of river, very little resistance could have been made. Believes however that the enemy intend rather to carry most of their force round to the support of Cornwallis. Fears for Gen. Greene, and also for French troops in the fleet. Recommends him to keep up correspondence with Gen. Muhlenberg. Desires immediate information of whatever passes. No. 66.

1781.—*April 11. Richmond.*—Acknowledging letter of 10th inst. Gives his reasons for not ordering back the militia. Gen. Weedon's presence, however, needed there at once. News of the arrival at Fredericksburg of four field pieces and ammunition, conveyed by a detachment of Maryland troops under Col. Stewart. These together with Gen. Weedon's forces should prevent any considerable damage. Desires some word as to his movements and those of the enemy. No. 84.

THORNTON, (Col.):

1781.—*June 3.*—Enemy began their retreat at 4 o'clock this morning from Stells. Left two of their men hanging on a tree and several negroes with the small pox. Desires this intelligence to be sent to the Marquis. Wishes to know where Wayne is. No. 102.

WALKER, JOHN:

1780.—*October 24. Philadelphia.*—Acknowledging favor of the 10th inst. Defeat of Ferguson encouraging. In a few days Col's Meade and Harrison will arrive in Virginia with all the news. Hopes to write him from Fredericksburg about the middle of November. Gen. Greene to take command of southern department.

P.S.—News just received of the capture of about 50 of the British East and West India fleets by the French and Spanish fleets off Cape Finistere. No. 46.

WASHINGTON, GEORGE, (General):

1777.—*March 27. Morristown.*—Acknowledging letter of 10th inst. Question of the promotion of Captains Washington and Thornton. Hopes Thornton will exert himself to the utmost to facilitate the recruiting of Thruston's regiment, as the latter's wound keeps him quiet. No sign of the recovered soldiers of the 3d regiment. Negligence and disobedience of officers must be remedied by strong measures. Indignant at the idea of a leave of absence for himself or his officers at such an important point in the campaign. Cannot consent to Gen. Weedon's being longer from the army than May 10th. Orders all officers of the Virginia troops, with certain exceptions, to join the army at once.

P.S.—Vessels with war stores arrived at Boston from France. Two prizes just taken, in the harbor also. No. 3.

1777.—*May 26. Morristown.*—Obligatory instructions concerning the army. Every soldier, with certain exceptions, to join his corps immediately. Each regiment in his (Weedon's) brigade to be completed to the establishment. Return of the brigade to be rendered every Monday. Find out cause of frequent desertions; call rolls regularly; no furloughs to be granted except in cases of extreme necessity. Careful supervision of the men's accoutrements, food, etc. Accept no resignation of a commissioned officer. What to do in case of a vacancy. Make up and deposit pay rolls in the hands of the Paymaster-General. Avoid heavy baggage on the march. Unless soldiers are sick or lame do not let them throw their arms or packs into wagons. Discourage vice and immorality

WASHINGTON, GENERAL (*continued*):

and gambling. Encourage attendance at Divine worship and amusements. No. 5.

1777.—*October 26. Headquarters.*—Council of war to be shortly called. Desires Gen. Weedon to state his sentiments on the eight questions which follow concerning the plans and welfare of the army. No. 6.

1777.—*December 3. Headquarters.*—Wishes to know by the morning his sentiments on the advisability of a winter's campaign and the practicability of an attack upon Philadelphia with the aid of a considerable body of militia. No. 9.

1783.—*October 24. Rocky Hill.*—Concerning the establishment of the Society of the Cincinnati in each of the southern States. The choice of President-General falling on himself and his duty being to name the place for the general meeting, he must know in which States the Society is established. Desires to know if it has taken place in Gen. Weedon's State.

No. 149.

WASHINGTON, JOHN A.:

1781.—*June 9. Major Nelson's, near Price's Ordinary.*—Ship sighted off Blackstone is supposed to be a flag-ship with necessaries for the convention prisoners. Has heard that a considerable fleet of the enemy's ships were at Gwynne's Island; no official account. If able to leave will wait upon him (Weedon) at his headquarters. Number of 1st division short of his expectation. No. 115.

1781.—*June 18. Mont Clear, Westmoreland Co.*—Reasons for his not visiting him (Gen. Weedon). While at Leeds heard that Major Mercer's horse with some infantry had captured some of the enemy's horse, but lost 12 men. Anxious to know the details of the affair, as his son Bushrod was one of the Major's volunteers. Col. Nelson holding a court-martial on several tories; sentence not published when he left Leeds. Believes enemy's vessels to be at mouth of river. Glad militia of certain counties are discharged, as his overseer, who is among them, is sorely needed on his estate.

N.B.—Apologizes for troubling him with enclosures for conveyance. No. 130.

UNKNOWN CORRESPONDENT:

No date.—Giving intelligence of the enemy's forces. Their crossing from Portsmouth to Norfolk 2500 or 3000 strong. Rumored that they are making a push to join Cornwallis. No. 153.

LETTERS FROM GENERAL WEEDON.

BLACKBURN, (Col.):

1781.—*June 8. Camp, Hunter's Heights.*—Situation of the Marquis LaFayette calls for the aid of every available horse. Lord Cornwallis pointing towards stores in the Southern Communication and the Marquis intending to hang on his rear until reinforced by cavalry and infantry. No. 113.

COMMANDING OFFICER IN BERKLEY:

1780.—*January 21. Falmouth.*—Has been necessary to reinforce the lower counties with 500 of his (Weedon's) best men. Enemy marching in force to Smithfield. Requests him to send two companies of good men by the shortest route. No. 31.

COOKE, (Major):

1780.—*October 31. Richmond.*—An order to guard small fleet of boats at Hoods, stationed there to transport troops. Utmost care wanted to keep boats in constant readiness. Large smoke on shore, the signal for them to come over. No. 23.

COUNCIL OF VIRGINIA:

1781.—*April 6. Williamsburg.*—Has sent a detachment to cooperate with militia for the protection of Virginia's defenceless counties. Does not wish to draw the farmers and planters into the field in force, but merely to prepare them to act on the shortest notice. Alarm posts and signals to be arranged and arms and ammunition to be ready for immediate service. No. 76.

DAVENPORT, (Capt.):

1781.—*April 8. Williamsburg.*—Acknowledging letter received that day. Sorry for fate of the Patriot, the result of the disobedience of Capt. Chandler, who was positively forbidden to risk an action. Unless his request to the county-lieutenant

DAVENPORT, CAPT. (*continued*):

for Warwick and Elizabeth City, to detach a body to join Captains Kelly and Davenport, is obeyed, will remove the troops and leave defence of the country to more able officers. Directing him (Davenport) to command the horse and Capt. Kelly the infantry, and both to act in conjunction as his executive officers, regardless of nice punctilios; also, to act on the defensive and keep him fully informed of every transaction. No. 81.

DAVIS, WILLIAM (Col.):

1780.—*November 23.*—Begging him to forward tents to Gen. Muhlenberg, who is sadly in need of them. Has given militia at Cabbin's Point an order on the Commissary of military stores at Chesterfield for arms. Requesting him (Davis) to send forward such of his militia as are arranged; arms and tents to be given them at Chesterfield, if not provided at Richmond. Hoping to join Gen. Muhlenberg before night. No. 61.

FEBIGER (Col.):

1780.—*August 31. Fredericksburg.*—Orders to him and Capt. Lovely to meet and make a survey of provisions and stores; reporting the quantity fit for use. The report, signed by six gentlemen. No. 38.

GATES (Gen.):

1780.—*September 16. Fredericksburg.*—Will forward shortly the 1000 camp-kettles ordered from Mr. James Hunter. Regrets exceedingly the misfortune near Camden. Second division of the fleet not yet arrived; said to be blocked up at Brest by a British fleet of thirty-two sail. No. 41.

1780.—*November 2.*—Arrangements being made to repel invading foe, who now occupy ground from Portsmouth to Suffolk. Encloses intelligence, gained from a prisoner, respecting enemy's strength, which, though small, cannot be attacked until militia is assembled, officered and armed. Gen. Muhlenberg, with 800 new levies and 80 old soldiers, has passed down James river; hopes he will stop enemy's depredations. Gen. Nelson forming militia at Williamsburg. Three hundred Marylanders to reinforce Gen. Gates' army. Intention of English to cover Lord Cornwallis's operations through North Carolina. No. 26.

GRAHAM, RICHARD:

1781.—*June 17. Fredericksburg.*—Acknowledging letter of 14th inst., and thanking him for procuring the hilts. Marquis in want of vinegar, bacon and shoes; desires his aid in procuring them. British moving toward Richmond. The Marquis at Deep Creek, twenty-three miles above. Lead of any description to be forwarded at once. Begs a quarter-cask of wine for "our good Marquis." No. 126.

GRAYSON, WILLIAM (Col.):

No date.—*Fredericksburg.*—Begs him to afford the bearer of this letter, Col. Febiger, all possible assistance in obtaining clothing for the new levies; otherwise, operations in Southern department must be exceedingly retarded. No. 14.

1780.—*October 29. Richmond.*—Enemy landed at Hampton and Portsmouth about the 22d; plundered the former place and reimbarked. Every department deranged. Warlike spirit of the Virginians. Using every possible exertion to arrange two armies; one to act on north side of James river, the other on the south. Gen. Muhlenberg has marched down with certain forces. Gen. Nelson at Williamsburg, assembling militia ordered there. Hard work, providing the army with necessaries. News from the South, Cornwallis retreating rapidly. Encloses particulars of Col. Campbell's action with Col. Ferguson; asks to have it published. Unless enemy can be removed from the State before cold weather the troops must suffer terribly from want of all things. In urgent need of tents and other supplies, promised by Col. Febiger from Philadelphia. No. 16.

1781.—*June 8. Camp, Hunter's Heights.*—The Marquis, having waited at Culpepper Church in vain for Gen. Wayne, advanced to Raccoon Ford. Cornwallis expected to strike Southern communication. Tarleton made descent on Charlottesville on the 4th, routed the assembly, and took stores and prisoners. Gives list of ammunition needed by the Marquis. Great and immediate need of clothing and shoes. Earnest appeal for the support and assistance of Congress. No. 111.

HENDRICK (Col.):

1781.—*June 17.* *Fredericksburg.*—Quotes passage from the Marquis's letter, dated from Deep Creek, speaking of his want of cavalry; also, shoes, vinegar and rum. Begs his (Hendrick's) help in procuring these things. Letter, to the officer commanding Moylan's detachment, must be carried to him with all speed. Steady and close exertions needed to save the country. Best route over which to send brigade of loaded wagons. No. 127.

JEFFERSON, THOMAS:

1780.—*November 3.* *Richmond.*—Enclosing return of provision stores. Stock on hand very inconsiderable. Sure Mr. Jefferson will obviate the evil.

P. S.—Despatches to Gen. Gates will not require particular express. No. 28.

1781—*April 2.* *Williamsburg.*—Mr. Armistead will name certain prisoners for exchange, which measure, if approved, will be carried into execution. Asks that marines taken at Warwick, if not yet sent to Richmond, may be detained until answer comes from British general. Has requested a delay of the ships sailing from New York with Col. Curl, until his (Jefferson's) pleasure is known concerning the exchange for Col. Allagood. No. 69.

1781.—*April 3.* *Williamsburg.*—Acknowledging despatches and forwarding those intended for the flag-ship. Incloses trustworthy account, which corroborates Capt. Ross's with respect reinforcements. Believes that the English will endeavor to succour Lord Cornwallis from Portsmouth by penetrating North Carolina. Question of supporting Gen. Greene powerfully and acting solely on the defensive in Virginia. A permanent and proper force of militia needed to prevent enemy from advancing far into the country. Begs for immediate supply of arms.

P. S.—Wishes to be kept advised of the fate of his friend Greene. No. 70.

1781.—*April 25.*—Inclosing copy of Gen. Phillips' letter of 12th inst.; also, papers concerning exchange of prisoners. Gen. Phillips' complaint of an infringement of the sacred rules of

JEFFERSON, THOMAS (*continued*):

flags of truce, as shown in the person of Mr. Armistead. Incloses a copy of Mr. Armistead's credentials. Has sent Gen. Phillips a copy of the flag with the persons' names and the business they went on. Advises the exchange of as many prisoners as the just rules of war authorize, and the choice of a convenient place for exchange. Marquis now crossing the river. Frederick and Barkley men not yet arrived. No. 87.

JONES (Serg't):

1780.—*August 28. Fredericksburg.*—Orders to proceed to the barracks in Albemarle, there take Col. James Wood's orders for recovering some deserters. Let it be known that all deserters may be assured of free pardon if they voluntarily deliver themselves up. No. 36.

KELLEY (Capt.):

No date.—Orders him to go into the lower country and protect the inhabitants, who are themselves to arm and help him. Capt. Davenport's troop of horse to act with him. Bids him contradict a wicked report to the effect that the army intends to evacuate the lower country. No. 13.

LAFAYETTE, MARQUIS DE:

1781.—*June 9. Camp, Hunter's Heights.*—Received the inclosed from Col. Richard Henry Lee, and has sent down an officer to ascertain clearly the truth of the matter. Expresses have been dispatched to Philadelphia for supplies and clothing, as requested. No. 117.

1781.—*June 11. Camp, Hunter's Heights.*—In consequence of the inclosed, has halted troops from below until further advice. Would submit it whether they had better not return to their own counties to defend them against the enemy's depredations. Officer sent down to ascertain truth of Col. Lee's report, not yet returned. No. 118.

1781.—*June 12. Camp, Hunter's Heights.*—Inclosing extract and copy of two letters received from Col. Grayson, respecting arms. Has stationed proper person at Noland's Ferry to forward them, as directed. Militia of King George and Stafford counties have gone home under promise to be ready to take arms at twelve hours' notice. Men from lower counties await his (LaFayette's) orders. No. 119.

LAFAYETTE, MARQUIS DE (*continued*):

1781.—*June 17. Fredericksburg.*—Acknowledging letter of previous day and promising to attend to every part. Wagons to be sent forward. Difficulties in the way of procuring many shoes. Has asked Gen. Morgan to send officer to seize all shoes in factories round about and send them on. Has sent on 750 stand of arms. Difficult to procure cartridges or lead. Has written to a party of horse from Maryland to press forward day and night. No. 128.

1781.—*June 20. Fredericksburg.*—Six wagons starting before night, with 700 gallons of whisky and 300 gallons of vinegar. Rum out of the question. Impossible to get any shoes in this neighborhood; hopes centre in the back counties. Has written about it to the Board of War. Incloses extract from Col. Grayson's letter. Question of equipping a volunteer corps of dragoons at Leesburg. Capt. Dixon's Volunteer Horse from Gloster hope to get off before night and reach camp on Friday. Desires to know the destination of the arms coming from Philadelphia. Number of arms sent forward. No. 134.

1781.—*June 20. Fredericksburg.*—Will cover all the stores that night. Troops under his command on other side of river. In consequence of his (LaFayette's) letter to Major Page, will afford every assistance to Gen. Wayne in his crossing of the two branches of the river. Weather, alarming! Will hold boats in order to recross, unless he receives other instructions. 200 men from King George have joined him.

P. S.—Col. Tupper and Mr. Kingsley on their way to him (LaFayette) with three or four thousand guineas and some despatches. No. 136.

LEWIS (Capt.):

1781.—*June 2.* From late intelligence, believes Gen. Wayne's troops will cross Norman's Ford. Orders to impress workmen, tools, rafts or any article which will facilitate their passage over the ford; also, if possible, to send an express to Mr. Bruce, who lives near Raccoon Ford and who owns a saw-mill. No. 101.

MATHEWS (Col.):

1781.—*March 31. Williamsburg.*—Desiring him to propose an exchange of volunteers taken at Charles City Court house for an equal number of marines taken in Warwick. No. 63.

MUHLENBERG (Gen.):

1780.—*August 28. Fredericksburg.*—Acknowledging letter of 24th inst. Informing him of number of arms sent forward. Regrets extremely misfortune near Camden. Need of provisions and lack of discipline among the militia proved Gates' overthrow. Has opened the general's letters, marked Public Service. No. 146.

1780.—*November 3. Richmond.*—Acknowledging two favors of 30th ult. Arms for troops at Cabbin's Point to be forwarded that day. Col. Southall's troop of horse has crossed to reinforce him (Muhlenberg), as requested. Engaged in getting a strong brigade together; would like any directions respecting the route and the most eligible position to take. If enemy's depredations are confined to Portsmouth and Princess Anne, will it be necessary to assemble such a large body in one place? Enemy's advantage on the water must be attended to. No. 27.

1781.—*April 4. Williamsburg.*—Gained information of Gen. Muhlenberg's situation through opening his letters to Baron Steuben. Enemy will repent making an attack on his side of river unless they come in force. Advantage the English have on the water. Baron Steuben, before leaving, ordered all the boats to Sandy Point; has sent a guard of forty men to protect them. Discusses his own plans and the enemy's. Positions of the two look-out boats. Any hopes of French fleet and troops landing at Cape Fear? Baron Steuben uneasy on their account. Begs to be kept fully advised of every movement. No. 74.

NELSON, THOMAS (Gen.):

1780.—*October 29. Richmond.*—Sends list of officers who the Executive Board have called upon to furnish their militia with field officers; also incloses an order of Council as a guide by which to arrange the troops. Will send Capt. Kirkpatrick to him in a day or two. Intended coming himself, but military matters too urgent. No. 15.

1780.—*October 30. Richmond.*—Introducing Capt. Kirkpatrick, whom he recommends to the command of a volunteer corps; praises his military experience and firmness. Leaves choice of station on James river to Gen. Nelson's superior knowl-

NELSON, THOMAS (*continued*):

edge of country. Will establish another fleet to be stationed at Sandy Point or Hoods. No. 19.

1780.—*November 2. Richmond.*—Acknowledging his favor of 21st ult. Evident that his despatches of 29th and 30th not yet received. Inclosed in them authority to establish a communication between his (Nelson's) troops and the advance body under Muhlenberg. This to be done with the utmost despatch. Wishes Col. Southall's forty horse to be sent to join Gen. Muhlenberg, who is in great need of them. No. 25.

1781.—*June 9. Camp, Hunter's Heights.*—In consequence of the report that the enemy is in the Rappahannock and Potomac rivers, has directed the colonels in the four lower counties to remain at home until further notice. Orders him (Nelson) to take command of troops from counties of Westmoreland, Richmond, Lancaster and Northumberland, to rendezvous at a convenient place and to consolidate, arrange and train the troops. Further minute directions concerning his movements, in case of the enemy's landing at certain points. No. 114.

1780.—*June 10. Camp, Hunter's Heights.*—Marquis de LaFayette desires a reinforcement of horse immediately. Enemy's superiority of horse subjects him to many evils. His position yesterday was near the borders of Orange county, pointing southward. No. 116.

PAYNE (*Gen.*):

1777.—*June 3. Camp, Hunter's Heights.*—Suggesting a change of route to Norman's Ford. Waiting for express returns from the Marquis to determine his own route. Has sent to the ford to make rafts in case the river rises. Evacuated Fredericksburg the night before and has four hundred militia with him. No. 104.

PRESIDENT OF CONGRESS:

1777.—*December 26. Camp, Valley Forge.*—A protest against the injustice of a resolve passed by Congress, which could affect his honor and his rank in the army. No. 11.

RUDE (Capt.):

1781.—*April 27. Fredericksburg.*—Desiring him to send at once all the cavalry fit for duty to join the Marquis, who is on his way to Richmond. No. 90.

RUSSELL, THOMAS:

1780.—*October 31. Richmond.*—Order to collect a fleet of flat-bottomed boats not to exceed twenty, and to station them at Hoods, on James river. No. 21.

SPOTSWOOD (Gen.):

1781.—*April 27. Fredericksburg.*—The Marquis anxious for a few horse to protect him till his reinforcements arrive. He is on his way to Richmond where there is not a man in arms. Enemy supposed to be in Petersburg. Richmond probably their next object. Need for cavalry. No. 91.

STEUBEN, BARON:

1781.—*April 1. Williamsburg.*—Letter of 28th ult. communicated change of position of troops. From information received, expected an attack, therefore drew (our) extended line together. Gen. Muhlenberg's orders were to keep near the enemy's lines, but before he knew their designs, they embarked. 700 of them crossed over to Newport News with intention of beating up troops at the Half-way House. Finding them withdrawn, they secretly and silently returned. Only nine small and shattered vessels of the enemy got up to Portsmouth with reinforcements. Incloses examination of some deserters. Murmuring of the people consequent on the withdrawal of his troops; has sent detachments there to pacify them. Arms badly needed. Disposition of vessels and boats. No. 67.

1781.—*April 1.* Acknowledging letter of 29th ult. Incloses a letter to him from Gen. Muhlenberg, with an apology for having opened it. Will see by it that the withdrawal of troops from below was exceedingly judicious, the enemy intending to attack some part of the dispersed line. Notwithstanding the necessity of the measure, the people below murmur and threaten to make terms with the enemy. Thinks of sending a light corps there with a prudent officer. Exceedingly distressed for arms. Would like 200 sent on immediately. Disposition of boats. Marquis' barge made prize of a vessel on James river, fitted out on a pirate plan, which had done much mischief to the shores of Maryland and Virginia. Mr. Lane sent the rascals to the Governor to meet their just rewards. No. 65.

STEUBEN, BARON (*continued*):

1781.—*April 3. Williamsburg.*—Apologizing for having opened a letter from Gen. Muhlenberg to him (Steuben). Account of Muhlenberg's confidential agent corroborates that of Capt. Ross. Always his own opinion that the English would try hard to succour Cornwallis by penetrating North Carolina, at the same time, holding a strong post in Virginia to keep them diverted. Fatal consequences should they prove superior in the South. Propriety of supporting Greene. Asks for directions concerning a considerable number of public horses, of no use to his post. Distressed for arms. No. 71.

1781.—*April 8. Williamsburg.*—Inclosing copies of his correspondence with Gen. Phillips, concerning exchange of prisoners. Careful in his letters not to show favoritism. Object of enemy's preparations probably a junction with Cornwallis, but uncertain by which route. French fleet arrived safely at Rhode Island. Sends British account of the engagement of the 16th. No. 80.

1781.—*April 25. Williamsburg.*—Acknowledging letter of 11th inst. from Richmond. Announcing his intended departure for Fredericksburg. Will report on his arrival. Incloses copies of his correspondence with Gen. Phillips. Hopes he has not incurred Baron Steuben's censure by what he has said. Exceedingly desirous of cultivating the liberal idea held out by Gen. Phillips, as it will result in reciprocal advantages. Has directed Col. Innes to take command until Gen. Nelson arrives. Incloses general return of the troops. No. 88.

1781.—*April 26. Fredericksburg.*—Concerning his correspondence with Gen. Phillips about the exchange of prisoners. Advises him to liberate all American prisoners taken in arms. Good results accruing from this. Many prisoners at large in Winchester, some of whom make their escape. Advantage of exchanging these very men for Americans on board prison-ships. Frederick and Barkley riflemen on their march. Unless directed otherwise, will come down with them. No. 89.

WASHINGTON, GEORGE (Gen.):

1777.—*December 29. Valley Forge.*—A detailed account of a permanent system to be adopted in future promotions, regula-

WASHINGTON, GENERAL (*continued*):

tions and arrangements in the army. One-half of the present staff belonging to the army, idle and pleasure-loving; mere sinecures, of no benefit to the public. Reforms needed. No. 12.

1780.—*August 24. Fredericksburg.*—Present military law for raising 3000 new levies exempts those who apprehend and deliver over deserters. Danger of impositions under this rule. Suggests slight changes in the law. Also proposes that Gen. Washington should offer free pardon to all deserters who deliver themselves up by a certain day. All who escaped from Bluford's rout brought in as deserters; this, of course, wrong. No. 33.

1781.—*April 8. Williamsburg.*—Acknowledging letter, directing the disposal of militia. Incloses general return of counties making his defences on his side of James river. In writing British General at Portsmouth about exchange of prisoners, the list for exchange left entirely to the Executive. Dangers of favoritism; therefore merely hinted at the justness of such a favor, leaving Mr. Armistead to mention Col. Curle as the object of the hint. Desire of Gen. Phillips, as well as himself, to encourage liberal exchanges, therefore begs to be authorized to assure the British General that on his sending out the whole number of prisoners taken in arms, an equal number shall be sent back. Enemy's preparations for a move; nearly all their ships gone out. No. 79.

1781.—*April 11. Williamsburg.*—Has received a report from a Mr. Turberville that a small fleet of the enemy's vessels is in the Potomac. Fears they will visit Hunter's works and the gun factory in Fredericksburg, both important points, totally undefended. Proposes marching some of the troops back for their defense. Names troops whose tour of duty will soon expire, as suitable for that purpose. Thinks Mr. Beal's offer of 1000 weight of lead ought to be accepted. No. 83.

WASHINGTON, JOHN A. (Col.):

1781.—*June 8. Camp, Hunter's Heights.*—Requesting troops to halt, as it appears the enemy are at Guynn's Island in the Potomac. Would like officer sent to get information and to report at once. Gives him leave to impress horses for this service, being careful to return them to their owners. No. 112.

WOOD, JAMES (Capt.):

1780.—*August 28. Fredericksburg.*—Has information of the whereabouts of four deserters. Desires him to send Sergeant Jones to apprehend them. Every one's duty to recover as many deserters as possible rather than allow rascals, after long concealing them, to give them up in order to get excused from service themselves. Gen. Gates defeated at Camden; has retreated to Hillsborough. Particulars not yet at hand. No. 34.

MISCELLANEOUS LETTERS AND PAPERS.

BRADFORD, SAMUEL K., Aid-de-Camp to WILLIAM PRICE, Wagon-Master:

1780.—*August 28. Fredericksburg.* — Orders to proceed with brigade of wagons to Richmond, and to suffer no delay en route. On arriving to apply to Brig.-Gen. Muhlenberg for orders, or in his absence to the officer in command, before unloading. Nature of service requiring utmost expedition and attention. This by order of Gen. Weedon. No. 35.

BRADFORD, SAMUEL K., to WILLIAM WOODSIDES:

1781.—*August 31. Fredericksburg.*—Orders to proceed with utmost despatch to Richmond with brigade of wagons, and to report to Gen. Muhlenberg, or in his absence, to the officer in command, before unloading. No. 37.

JEFFERSON, THOMAS, to MAJOR P. COOKE:

1780.—*November 2. In Council.*—Unless armed elsewhere, the fifty Marylanders passing to the southward can be armed at Richmond. Will countermand all the militia called from the proprietary counties. With this deduction, militia will number 4150, which, with the new levies, will be sufficient. No. 24.

JEFFERSON, THOMAS, to GEN. MUHLENBERG:

1780.—*October 28. Richmond.*—Incloses latest intelligence from north side of river, also advice of Council for regimenting the militia. Leaves it to the General to overcome certain difficulties which must arise between the militia and the regular Captains and subalterns. Incloses names of many resigned and supernumerary officers and dates of their original appointments, also letters to be directed to such as can be got. No. 48.

NELSON, WILLIAM (Col. Commandant), orders from:

1781.—*June 20. Leeds.*—Orders for Capt. —— to take command of a company, to march them to —— county and use utmost exertion to prevent depredations of the enemy; also, to change ground frequently, to keep order and discipline among the men, to attend to the shores of rivers, etc., and to prevent escape of slaves and disaffected persons. No. 124.

PAGE, JOHN, to GEN. WASHINGTON (?):

1777.—*October 30. Williamsburg.*—Received his two letters, one announcing Burgoyne's surrender. Joy of the troops! Now past ten P.M., and the victory still being celebrated in the streets. Britain's wilful abuse of power. Heaven on "our" side. Confident of ultimate victory. Letter just received from Baltimore says Howe is retreating to his ships and Washington is in possession of Philadelphia. If true, congratulations! George III must see he paid dear for the taking of Philadelphia. Very late and has been obliged to go into the streets to prevent a riot. No. 8.

PHILLIPS, WILLIAM, to GEN. MUHLENBERG:

1781—*April 7. Portsmouth.*—Protest against allowing individuals to enter within the outposts of the King's forces under his command, unless proceeding directly from an American general officer. Such requests as those respecting negroes may be sent in writing. As regards subject of negroes, refers him to the explanation given by Brigadier-General Arnold. No. 78.

STEUBEN, BARON, general orders of:

1781.—*April 1. Chesterfield.*—Every wagon, horse, etc., impressed since 1st day of January to be collected and returned to Quartermaster at Williamsburg or Suffolk without delay. Inattention to this order an injustice to the public, and shall be treated as such. No. 68.

WEEDON, GEN., general orders from:

1781.—*June 16. Leeds.*—Orders to allow the men of their county furloughs to go home, but to be ready at a moment's warning to repel the enemy, should they attempt to land in force. Humane reasons for the above indulgence of furloughs. Place to have a legion of horse and foot formed in the lower counties to be composed of single men. No. 124.

WEEDON'S (Gen.), handwriting:

1780.—*November 2. Richmond.*—Examination of a deserter, by name Peter Christian (Sergeant). Suggests the countermanding of some of the militia called into service, in consequence of the information gathered from this deserter, a reliable man. No. 57.

No date.—No name. Note relating to the landing of the British at the capes of Virginia. Detailed account of their number and movements. No. 152.

CALENDAR OF THE CORRESPONDENCE OF RICHARD HENRY LEE AND ARTHUR LEE.

IN THE LIBRARY OF THE AMERICAN PHILOSOPHICAL SOCIETY.[1]

Prepared under the direction of the Committee on Historical Manuscripts.

(*Read May 5, 1899.*)

LETTERS TO RICHARD HENRY LEE.

ADAMS, JOHN:

1780.—*March 15, Paris, Rue de Richelieu, Hotel de Valois.* See R. H. Lee's "Life of Richard Henry Lee," Philadelphia, 1825, Vol. ii, p. 137. Vol. ii, p. 199, No. 55.

1785.—*April 29, Auteuil.* See "Life of Richard Henry Lee," Vol. ii, p. 140. Vol. ii, p. 290, No. 78.

1785.—*July 15, Westminster, Grosvenor Square.* See "Life of Richard Henry Lee," Vol. ii, p. 141. Vol. ii, p. 299, No. 80.

1785.—*September 6, Westminster, Grosvenor Square.* See "Life of Richard Henry Lee," Vol. ii, p. 143. Vol. ii, p. 311, No. 83.

ADAMS, SAMUEL:

1773.—*April 10, Boston.* See "Life of Richard Henry Lee," Vol. i, p. 87. Vol. i, p. 71, No. 23.

---

[1] These manuscript letters are contained in two volumes.

ADAMS, SAMUEL (*continued*):

1774.—*July 15, Boston.* See "Life of Richard Henry Lee," Vol. i, p. 99. Vol. i, p. 61, No. 21.

1775.—*March 21, Boston.* Unfinished letter. See "Life of Richard Henry Lee," Vol. ii, p. 118. Vol. i, p. 133, No. 39.

1776.—*July 15, Philadelphia.* See "Life of Richard Henry Lee," Vol. i, p. 182. Vol. i, p. 215, No. 62.

1777.—*June 26, Philadelphia.* See "Life of Richard Henry Lee," Vol. ii, p. 120. Vol. i, p. 325, No. 93.

1778.—*April 20, Boston.* See "Life of Richard Henry Lee," Vol. ii, p. 124. Vol. ii, p. 55, No. 17.

1784.—*December 9, Boston.* See "Life of Richard Henry Lee," Vol. ii, p. 127. Vol. ii, p. 250, No. 70.

1784.—*December 23, Boston.* See "Life of Richard Henry Lee," Vol. ii, p. 128. Vol. ii, p. 258, No. 70.

1787.—*December 3, Boston.* See "Life of Richard Henry Lee," Vol. ii, p. 130. Vol. ii, p. 319, No. 85.

1789.—*April 22, Boston.* See "Life of Richard Henry Lee," Vol. ii, p. 132. Vol. ii, p. 335, No. 89.

1789.—*July 14, Boston.* See "Life of Richard Henry Lee," Vol. ii, p. 133. Vol. ii, p. 339, No. 90.

1789.—*August 24, Boston.* See "Life of Richard Henry Lee," Vol ii, p. 134. Vol. ii, p. 347, No. 92.

1789.—*August 29, Boston.* See "Life of Richard Henry Lee," Vol. ii, p. 135. Vol. ii, p. 351, No. 93.

CARMICHAEL, WILLIAM:

1777.—*March 17, Paris.* Slightly abbreviated in "Life of Richard Henry Lee," Vol. i, p. 197. Vol. i, p. 289, No. 84.

CONWAY, THOMAS:

1778.—*May 23, Fishkill.* See "Life of Richard Henry Lee," Vol. i, p. 294. Vol. ii, p. 59, No. 18.

CHASE, SAMUEL:

1776.—*July 30, Philadelphia.* See "Life of Richard Henry Lee," Vol. ii, p. 180. Vol. i, p. 219, No. 63.

CHASE, SAMUEL (*continued*):

1777.—*November 28, Annapolis.* See "Life of Richard Henry Lee," Vol. ii, p. 182. Vol. ii, p. 27, No. 9.

1789.—*July 2, Baltimore* (probably to R. H. Lee). See "Life of Richard Henry Lee," Vol. ii, p. 183.
Vol. ii, p. 323, No. 86.

BARON DE KALB:

1777.—*September 16, Bristol.* See "Life of Richard Henry Lee," Vol. i, p. 296. Vol. i, p. 339, No. 99.

1778.—*August 17, Camp at White Plains.* See "Life of Richard Henry Lee," Vol. i, p. 295. Vol. ii, p. 91, No. 27.

DICKINSON, JOHN:

1768.—*August 10, Philadelphia.* Fragment. Merely the ending of a letter. Vol. i, p. 37, No. 15.

1769.—*January 16, Philadelphia.* See "Life of Richard Henry Lee," Vol. i, p. 68. Vol. i, pp. 33, 32, No. 12.

1769.—*June 22, Philadelphia.* See "Life of Richard Henry Lee," Vol. i, p. 76. Vol. i, pp. 31, 30, No. 11.

1773.—*May 30, Fairhill.* See "Life of Richard Henry Lee," Vol. i, p. 91. Vol. i, pp. 36, 35, No. 14.

FLORIDA BLANCA, COUNT DE:

1784.—*October 8, St. Lorenzo.* A letter of introduction for Don Diego de Gardoque, appointed by the King of Spain Minister Plenipotentiary to the United States.
Vol. ii, p. 246, No. 67.

GATES, HORATIO:

1778.—*September 23, Danbury.* See "Life of Richard Henry Lee," Vol. ii, p. 227. Vol. ii, p. 102, No. 29.

GERRY, ELBRIDGE:

1789.—*February 9, Cambridge.* See "Life of Richard Henry Lee," Vol. ii, p. 144. Vol. ii, p. 327, No. 87.

GRASSE, COUNT DE:

1781.—*January 8, Paris.* French letter and translation. See "Life of Richard Henry Lee," Vol. i, p. 298.
Vol. ii, p. 209, No. 57.

HENRY, PATRICK:

1778.—*June 18, Williamsburg.* See "Life of Richard Henry Lee," Vol. i, p. 195. Vol. ii, p. 63, No. 19.

HOLKER (*French Consul*):

1779.—*April 5.* See "Life of Richard Henry Lee," Vol. i, p. 199. Vol. ii, p. 150, No. 41.

1779.—*April 22, Philadelphia.* Offering to the United States a loan of a million dollars, on behalf of several persons in France. Vol. ii, p. 146, No. 40.

JAY, JOHN:

1823.—*February 12, Bedford, Westchester county, N. Y.* See "Life of Richard Henry Lee," Vol. i, p. 270. Vol. ii, p. 359, No. 95.

JEFFERSON, THOMAS:

1779.—*June 17, Williamsburg.* See "Life of Richard Henry Lee," Vol. ii, p. 189. Vol. ii, p. 164, No. 45.

1781.—*March 10.* In council. See "Life of Richard Henry Lee," Vol. ii, p. 190. Vol. ii, p. 212, No. 58.

JENINGS, EDMUND:

1771.—*August 17, London.* Letter slightly abbreviated. See "Life of Richard Henry Lee," Vol. i, p. 50. Vol. i, p. 87, No. 27.

1771.—*December 29, London.* See "Life of Richard Henry Lee," Vol. i, p. 50. Vol. i, p. 111, No. 33.

LAFAYETTE, MARQUIS DE:

1778.—*July 2, Camp at Brunswick.* See "Life of Richard Henry Lee," Vol. ii, p. 105. Vol. ii, p. 73, No. 22.

1779.—*January 7, on board the "Alliance."* See "Life of Richard Henry Lee," Vol. ii, p. 107. Vol. ii, p. 130, No. 36.

1779.—*June 13.* Bidding him good-by on the eve of his departure for Versailles. Compliments him on his son. Desires Arthur Lee's further acquaintance. Vol. ii, p. 156, No. 43.

1779.—*October 7, Havre.* See "Life of Richard Henry Lee," Vol. ii, p. 108. Vol. ii, p. 134, No. 37.

LAFAYETTE, MARQUIS DE (*continued*):

1780.—*December 17, Philadelphia.* See "Life of Richard Henry Lee," Vol. ii, p. 109. Vol. ii, p. 192, No. 53.

1785.—*March 16, Paris* (probably to R. H. Lee). See "Life of Richard Henry Lee," Vol. ii, p. 109.
Vol. ii, p. 282, No. 76.

LAURENS, HENRY:

1779.—*June 22, Philadelphia.* See "Life of Richard Henry Lee," Vol. ii, p. 233. Vol. ii, p. 160, No. 44.

1779.—*August 31, Philadelphia.* See "Life of Richard Henry Lee," Vol. ii, p. 234. Vol. ii, p. 176, No. 49.

1779.—*September 28, Philadelphia.* See "Life of Richard Henry Lee," Vol. ii, p. 236. Vol. ii, p. 184, No. 51.

1779.—*October 12, Philadelphia.* No further news of Count d'Estaing. Letters from France to Col. F. L. Lee and R. H. Lee; they are to be printed if possible. Two letters to be read in Congress. Salaries of Ministers Plenipotentiary. Refuses vote to Carmichael; his reason for this.
Vol. ii, p. 188, No. 52.

LEE, ARTHUR:

1768.—*December 27, London.* See "Life of Richard Henry Lee," Vol. i, p. 59. Vol. i, p. 39, No. 16.

1768 or 1769.—*October 9* (probably to R. H. Lee). See "Life of Arthur Lee," Boston, 1829. Vol. i, p. 200; see "Life of Richard Henry Lee," Vol. i, p. 260. Paragraph omitted in printed copy, in which he begs his brother to send to Dr. Fothergill and Dr. Cullen some American wine.
Vol. i, p. 53, No. 19.

1769.—*August 15, Bath.* See "Life of Arthur Lee," Vol. i, p. 194; see "Life of Richard Henry Lee," Vol. i, p. 255.
Vol. i, p. 43, No. 17.

1769.—*September 18, Ipswich.* See "Life of Arthur Lee," Vol. i, p. 190; see "Life of Richard Henry Lee," Vol. i, p. 72.
Vol. i, p. 19, No. 7.

1769.—*November 19, Bath.* See "Life of Arthur Lee," Vol. i, p. 193; see "Life of Richard Henry Lee," Vol. i, p. 81.
Vol. i, p. 17, No. 6.

LEE, ARTHUR (*continued*):

1769.—*November 15, Bath.* See "Life of Arthur Lee," Vol. i, p. 197; see "Life of Richard Henry Lee," Vol. i, p. 258. Vol. i, p. 51, No. 18.

1769.—*December 3, Bow Wood.* See "Life of Richard Henry Lee," Vol. i, p. 75. Vol. i, p. 57, No. 20.

1770.—*May 20, London.* See "Life of Arthur Lee," Vol. i, p. 205; see "Life of Richard Henry Lee," Vol. i, p. 82. Latter part of letter was published, in which he speaks of his five years' law course. Some business about land grants. Vol. i, p. 65, No. 22.

1770.—*October 20, London.* Concerning the slight chance of procuring his brother Richard a secretaryship. Vol. i, p. 121, No. 36.

1772.—*August 17, London.* Much abbreviated in "Life of Richard Henry Lee," Vol. i, p. 83; much abbreviated in "Life of Arthur Lee," Vol. i, p. 206. Part omitted speaks of personal money matters. Death of Mr. Horrocks; character of his successor. Question of school for his nephews. Dr. Franklin's continued stay gives him small chance of the Boston Agency. Influence requisite to obtain for his brother a diplomatic position. Vol. i, p. 91, No. 28.

1774.—*March 18, London.* See "Life of Arthur Lee," Vol. i, p. 207; see "Life of Richard Henry Lee," Vol. i, p. 93. Vol. i, pp. 78, 77, 76, 75, No. 24.

1774.—*December 22, 24, 26, London.* See "Life of Arthur Lee," Vol. i, p. 211; see "Life of Richard Henry Lee," Vol. i, p. 134. Vol. i, p. 107, No. 32.

LEE, CHARLES:

1775.—*September 2, Camp on Winter Hill.* See "Life of Richard Henry Lee," Vol. i, p. 157. Vol. i, p. 151, No. 45.

1775.—*December 12, Camp.* See "Life of Richard Henry Lee," Vol. ii, p. 214. Vol. i, p. 163, No. 48.

1776.—*May 10, Williamsburg.* See "Life of Richard Henry Lee," Vol. i, p. 166. Postscript omitted in published copy. Urges Congress to take *Niagara* and *Detroit.* Too much money and attention paid to fleet. Vol. i, p. 203, No. 59.

LEE, CHARLES (*continued*):

1776.—*April 5, Williamsburg.* See "Life of Richard Henry Lee," Vol. ii, p. 215. His private opinion of Pendleton and Bland omitted in the published letter.
Vol. i, p. 195, No. 57.

1776.—*April 12, Williamsburg.* See "Life of Richard Henry Lee," Vol. ii, p. 216. Vol. i, p. 199, No. 58.

1777.—*While in Captivity.* See "Life of Richard Henry Lee," Vol. i, p. 180. Vol. ii, p. 42, No. 13.
For answer, see MS. Vol. i, p. 187.

LEE, WILLIAM:

1777.—*December 3, Paris.* Deals with the refusal of the King of Prussia to allow troops in the service of Great Britain to pass through his dominions, *en route* for America. Lord Chatham's speech in the House of Lords.
Vol. ii, p. 31, No. 10.

1778.—*September 21, Paris.* See "Life of Richard Henry Lee," Vol. ii, p. 212. Vol. ii, p. 97, No. 28.

1778.—*October 17, Frankfort, Germany.* See "Life of Richard Henry Lee," Vol. ii, p. 228. Paragraph omitted in published copy, concerning grants of land. Vol. ii, p. 116, No. 32.

LOVELL, JAMES:

1777.—*December 28* (probably to R. H. Lee). See "Life of Richard Henry Lee," Vol. ii, p. 150.
Vol. ii, p. 37, No. 12.

1778.—*December 18.* Enclosing letter from Arthur Lee to Samuel Adams, dated Paris, July 31. See "Life of Richard Henry Lee," Vol. ii, p. 148. Vol. ii, p. 126, No. 35.

1779.—*August 17.* See "Life of Richard Henry Lee," Vol. ii, p. 146. Vol. ii, p. 168, No. 47.

1780.—*August 31.* See "Life of Richard Henry Lee," Vol. i, p. 231. Vol. i, p. 15, No. 5.

M'KEAN, THOMAS:

1780.—*March 25, Philadelphia.* See "Life of Richard Henry Lee," Vol. ii, p. 176. Vol. ii, p. 138, No. 38.

Mifflin, Thomas (Gen.):

1777.—*November 5, Reading.* See "Life of Richard Henry Lee," Vol. ii, p. 173. Vol. ii, p. 13, No. 5.

1777.—*November 12, Reading.* See "Life of Richard Henry Lee," Vol. ii, p. 174. Vol. ii, p. 23, No. 8.

Monroe, James:

1783.—*April 4, King George.* See "Life of Richard Henry Lee," Vol. ii, p. 225. Vol. ii, p. 236, No. 64.

1786.—*May 24, New York* (probably to R. H. Lee). See "Life of Richard Henry Lee," Vol. ii, p. 224. Vol. ii, p. 315, No. 84.

Morris, Gouverneur:

1775.—*Philadelphia.* See "Life of Richard Henry Lee," Vol. ii, p. 154. Vol. i, p. 167, No. 49.
For answer see MS. Vol. i, p. 141.

Page, John:

1776.—*February 20, Williamsburg.* See "Life of Richard Henry Lee," Vol. ii, p. 199. Vol. i, p. 179, No. 53.

1778.—*July 10, Williamsburg.* See "Life of Richard Henry Lee," Vol. ii, p. 200. Vol. ii, p. 75, No. 23.

1778.—*October 15, Williamsburg.* See "Life of Richard Henry Lee," Vol. ii, p. 201. Vol. ii, p. 112, No. 31.

Page, Mann:

1777.—*September 23, Mansfield.* See "Life of Richard Henry Lee," Vol. ii, p. 203. Vol. i, p. 343, No. 100.

1777.—*October 27, Mansfield.* See "Life of Richard Henry Lee," Vol. ii, p. 203. Vol. ii, p. 9, No. 4.

1778.—*June 23, Mansfield.* See "Life of Richard Henry Lee," Vol. ii, p. 204. Vol. ii, p. 67, No. 20.

Paine, Thomas:

1777.—*July 1, Philadelphia.* See "Life of Richard Henry Lee," Vol. ii, p. 156. Vol. i, p. 333, No. 96.

Peabody, Nathaniel:

1780.—*October 27, Morristown, N. J.* See "Life of Richard Henry Lee," Vol. ii, p. 157. Vol. ii, p. 195, No. 54.

PENDLETON, EDMUND :

1776.—*April 8, Caroline.* See "Life of Richard Henry Lee,"
Vol. ii, p. 192. Vol. i, p. 223, No. 64.

1777.—*September 3, Caroline.* See "Life of Richard Henry
Lee," Vol. ii, p. 193. Vol. i, p. 337, No. 98.

1777.—*October 11, Caroline.* See "Life of Richard Henry Lee,"
Vol. ii, p. 193. Vol. i, p. 347, No. 101.

1785.—*February 28, Edmundsburg.* See "Life of Richard Henry
Lee," Vol. ii, p. 195. Vol. ii, p. 270, No. 73.

1785.—*March 7, Edmundsburg.* See "Life of Richard Henry
Lee," Vol. ii, p. 196. Vol. ii, p. 274, No. 74.

1785.—*April 18, Edmundsburg, Va.* See "Life of Richard
Henry Lee," Vol. ii, p. 197. Vol. ii, p. 286, No. 77.

"PHILOPATRIA :"

1775.—*June 1, Eastown.* See "Life of Richard Henry Lee,"
Vol. i, p. 155. Vol. i, p. 143, No. 43.

PULASKI, COUNT :

1778.—*August 13, Wilmington.* See "Life of Richard Henry
Lee," Vol. i, p. 296. Vol. ii, p. 87, No. 26.

REED, JOSEPH :

1780.—*April 15, Philadelphia.* See "Life of Richard Henry
Lee," Vol. ii, p. 175. Vol. ii, p. 142, No. 39.

RUSH, BENJAMIN :

1776.—*December 20, Philadelphia.* See "Life Richard Henry
Lee," Vol. ii, p. 159. Paragraph about Mr. Dickinson
omitted in published letter. Vol. i, p. 230, No. 67.

1776.—*December 21, near Bristol.* See "Life of Richard Henry
Lee," Vol. ii, p. 160. Advice about recruiting the army
omitted in published letter. Vol. i, p. 237, No. 68.

1776.—*December 30, Crossides.* See "Life of Richard Henry
Lee," Vol. ii, p. 161. Vol. i, p. 243, No. 70.

1776.—*January 6, Bordentown.* See "Life of Richard Henry
Lee," Vol. ii, p. 163. Vol. i, pp. 178, 177, No. 52.

1777.—*January 7, Princeton.* See "Life of Richard Henry Lee,"
Vol. ii, p. 163. Vol. i, p. 265, No. 77.

RUSH, BENJAMIN (*continued*):

1777.—*January 14, Philadelphia.* See "Life of Richard Henry Lee," Vol. ii, p. 165. Vol. i, p. 273, No. 79.

1777.—*January 14, Philadelphia.* See "Life of Richard Henry Lee," Vol. ii, p. 166. Vol. i, p. 277, No. 80.

SCHUYLER, PHILIP:

1775.—*October 19, Ticonderoga.* See "Life of Richard Henry Lee," Vol. ii, p. 155. Vol. i, p. 159, No. 47.

SHIPPEN, WILLIAM, JR.:

1776.—*December 17, Bethlehem.* See "Life of Richard Henry Lee," Vol. ii, p. 167. Vol. i, p. 229, No. 66.

1776.—*December 20, Bethlehem.* See "Life of Richard Henry Lee," Vol. ii, p. 168. Vol. i, p. 247, No. 71.

1777.—*January 17, Philadelphia.* See "Life of Richard Henry Lee," Vol. ii, p. 169. Vol. i, pp. 281, 282, No. 81.

STEPHEN, ADAM:

1774.—*August 27, Berkeley Courthouse.* See "Life of Richard Henry Lee," Vol. ii, p. 207. Vol. i, p. 95, No. 29.

1775.—*February 1.* See "Life of Richard Henry Lee," Vol. ii, p. 208. Vol. i, p. 125, No. 37.

1775.—*February 17.* See "Life of Richard Henry Lee," Vol. ii, p. 210. Vol. i, p. 129, No. 38.

1775.—*September 23, Pittsburg.* See "Life of Richard Henry Lee," Vol. ii, p. 211. Vol. i, p. 155, No. 46.

1777.—*April 22, Chatham.* See "Life of Richard Henry Lee," Vol. ii, p. 211. Vol. i, p. 297, No. 86.

SULLIVAN, JAMES:

1789.—*April 11, Boston.* See "Life of Richard Henry Lee," Vol. ii, p. 152. Vol. ii, p. 331, No. 88.

WASHINGTON, GEORGE:

1774.—*August 9, Fredericksburg.* See "Life of Richard Henry Lee," Vol. i, p. 105. Vol. i, p. 83, No. 26.

1775.—*July 10, Camp at Cambridge.* See "Life of Richard Henry Lee," Vol. ii, p. 1. No postscript in original MS. Vol. i, p. 147, No. 44.

WASHINGTON, GEORGE (*continued*):

1775.—*October 29, Cambridge.* See "Life of Richard Henry Lee," Vol. ii, p. 6. Vol. i, p. 99, No. 30.

1775.—*November 27, Cambridge.* See "Life of Richard Henry Lee," Vol. ii, p. 7. Vol. i, p. 103, No. 31.

1775.—*December 26, Cambridge.* See "Life of Richard Henry Lee," Vol. ii, p. 8. Vol. i, p. 183, No. 54.

1776.—*April 4, Cambridge.* See "Life of Richard Henry Lee," Vol. ii, p. 10. Unpublished P. S. Speaks of the need of a hospital. Vol. i, p. 189, No. 56.

1776.—*May 11, New York.* See "Life of Richard Henry Lee," Vol. ii, p. 11. Vol. i, p. 207, No. 60.

1777.—*January 10, Morristown.* See "Life of Richard Henry Lee," Vol. ii, p. 11. Vol. i, p. 269, No. 78.

1777.—*March 6, Morristown.* See "Life of Richard Henry Lee," Vol. ii, p. 12. Vol. i, p. 285, No. 83.

1777.—*April 24, Morristown.* See "Life of Richard Henry Lee," Vol. ii, p. 12. Vol. i, p. 301, No. 87.

1777.—*May 10, Morristown.* See "Life of Richard Henry Lee," Vol. ii, p. 15. Vol. i, p. 305, No. 88.

1777.—*May 17, Morristown.* See "Life of Richard Henry Lee," Vol. ii, p. 15. Vol. i, p. 309, No. 89.

1777.—*June 1, Camp at Middlebrook.* See "Life of Richard Henry Lee," Vol. ii, p. 18. Vol. i, p. 315, No. 91.

1778.—*February 15, Valley Forge.* See "Life of Richard Henry Lee," Vol. ii, p. 20. Vol. ii, p. 47, No. 15.

1778.—*August 10, White Plains* (probably to R. H. Lee). See "Life of Richard Henry Lee," Vol. ii, p. 22. Vol. ii, p. 83, No. 25.

1778.—*September 23, Fredericksburg, N. Y.* See "Life of Richard Henry Lee," Vol. ii, p. 23. Vol. ii, p. 108, No. 30.

1779.—*May 5, Headquarters Middle Brook* (not only to R. H. Lee but to Henry Lawrence and Thomas Burke). See "Life of Richard Henry Lee," Vol. ii, p. 24. Vol. ii, p. 152, No. 42.

WASHINGTON, GEORGE (*continued*):

1784.—*June 12, Mount Vernon.* See "Life of Richard Henry Lee," Vol. ii, p. 25. Vol. ii, p. 242, No. 66.

1784.—*December 14, Mount Vernon.* See "Life of Richard Henry Lee," Vol. ii, p. 6. Vol. ii, p. 258, No. 71.

1785.—*February 8, Mount Vernon.* See "Life of Richard Henry Lee," Vol. ii, p. 28. Vol. ii, p. 262, No. 72.

1785.—*March 15, Mount Vernon.* See "Life of Richard Henry Lee," Vol. ii, p. 32. Vol. ii, p. 272, No. 75.

1785.—*June 22, Mount Vernon* (probably to R. H. Lee). See "Life of Richard Henry Lee," Vol ii, p. 31. Vol. ii, p. 295, No. 79.

1785.—*August 22, Mount Vernon* (probably to R. H. Lee). See "Life of Richard Henry Lee," Vol. ii, p. 33. Vol. ii, p. 307, No. 82.

1789.—*August 2, New York.* See "Life of Richard Henry Lee," Vol. ii, p. 36. Vol. ii, p. 343, No. 91.

WEEDON, GEORGE:

1781.—*June 15, Fredericksburg.* See "Life of Richard Henry Lee," Vol. ii, p. 205. Vol. ii, p. 216, No. 59.

1781.—*August 2, Fredericksburg.* See "Life of Richard Henry Lee," Vol. ii, p. 206. Vol. ii, p. 220, No. 60.

1781.—*September 20, Camp, Gloucester Courthouse.* See "Life of Richard Henry Lee," Vol. ii, p. 206. Vol. ii, p. 228, No. 62.

WHIPPLE, WILLIAM:

1778.—*November 8, Philadelphia.* See "Life of Richard Henry Lee," Vol. i, p. 216. Vol. i, p. 120, No. 33.

1779.—*August 23, Philadelphia.* See "Life of Richard Henry Lee," Vol. ii, p. 111. Vol. ii, p. 172, No. 48.

1779.—*September 18, Philadelphia.* See "Life of Richard Henry Lee," Vol. ii, p. 112. Vol. ii, p. 180, No. 50.

1783.—*April 17, Portsmouth, N. H.* See "Life of Richard Henry Lee," Vol. i, p. 238. Vol. ii, p. 240, No. 65.

WHIPPLE, WILLIAM (*continued*):

1783.—*September 15, Portsmouth.* See "Life of Richard Henry Lee," Vol. ii, p. 113. Vol. ii, p. 232, No. 63.

WYTHE, GEORGE:

1777.—*August 24, Williamsburg.* See "Life of Richard Henry Lee," Vol. ii, p. 185. Vol. ii, pp. 336, 335, No. 97.

1777.—*October 18, Williamsburg.* See "Life of Richard Henry Lee," Vol. ii, p. 186. Vol. ii, p. 1, No. 1.

1777.—*November 6, Williamsburg.* See "Life of Richard Henry Lee," Vol. ii, p. 187. Vol. ii, p. 17, No. 6.

1778.—*August 1, Williamsburg.* See "Life of Richard Henry Lee," Vol. ii, p. 187. Vol. ii, p. 79, No. 24.

LETTERS TO ARTHUR LEE.

ADAMSON, DR. (in Latin):

1766.—*February 22.* Enclosing a leaf (since lost) of some recently discovered plant. Expresses a hope that Mr. Lee will become the botanist of America. Vol. i, p. 1, No. 1.

BARRÉ (Col.):

1771.—*January 31, London.* See "Life of Richard Henry Lee," Vol. i, p. 265. Vol. i, pp. 82, 83, No. 25.

CARDROSS, LORD (afterwards Earl Buchan):

1767.—*October 31, Walcot near Bath.* See "Life of Richard Henry Lee," Vol. i, p. 263; see "Life of Arthur Lee," Vol. ii, p. 345. Vol. i, p. 21, No. 8.

JONES, SIR WILLIAM:

1790.—*October 14, Bengal, Chrisna Nagar.* A letter concerning the legal affairs of Mr. Stepdoe. Postscript dated Calcutta, November 7, 1790. Vol. ii, p. 355, No. 94.

LEE, WILLIAM:

1780.—*August 15.* See "Life of Richard Henry Lee," Vol. ii, p. 231. Vol. ii, p. 166, No. 46.

M'KEAN, THOMAS:

1781.—*September 4, Philadelphia.* See "Life of Richard Henry Lee," Vol. ii, p. 178. Vol. ii, p. 224, No. 61.

WILKES, JOHN:

1777.—*November 9, Prince's Court.* See "Life of Richard Henry Lee," Vol. i, p. 264. Vol. ii, p. 19, No. 7.

WYNDHAM, WILLIAM:

1778.—*March 12, Dunkirk.* See "Life of Richard Henry Lee," Vol. i, p. 266. Vol. ii, p. 51, No. 16.

LETTERS FROM RICHARD HENRY LEE.

DICKINSON, JOHN:

1768.—*November 26, Chantilly, Va.* See "Life of Richard Henry Lee," Vol. i, p. 66. Vol. i, pp. 37, 38, 34, No. 13.

1773.—*April 4, Chantilly, Va.* See "Life of Richard Henry Lee," Vol. i, p. 90. For answer see "Life of R. H. Lee," Vol. i, p. 91. Vol. i, p. 29, 36, No. 10.

FLORIDA BLANCA, COUNT DE:

1785.—*October 6, New York.* Impaired health necessitates his retirement from Congress. Assures him that Don Diego de Gardoque has been received with due honor. Desires above all things friendly and commercial relations with Spain. Vol. ii, p. 247, No. 68.

HENRY, PATRICK:

1777.—*May* —. Speaks of accusations made against him by his enemies. Gives hopeful account of the army. Gen. Tryon's wound mortal. Vol. i, p. 211, No. 61.

JOHNSON (GOV.):

1777.—*December 13, Stafford Co.* About the Marylanders trading with the English ships of war. Advises means to prevent its continuance. Vol. ii, p. 35, No. 11.

LEE, CHARLES:

1777.—*February 11, Philadelphia.* See "Life of Richard Henry Lee," Vol. i, p. 181. Vol. i, p. 187, No. 55.

MORRIS, GOUVERNEUR:

1775.—*May 28.* See "Life of Richard Henry Lee," Vol. ii, p. 155. Vol. i, p. 141, No. 42.

PAINE, THOMAS:

1777.—*July 13, Chantilly, Va.* Concerning the importance of France and Spain as allies. Advises their being at once informed of American achievements so far.
Vol. i, p. 331, No. 95.

WASHINGTON, GEORGE:

1777.—*May 22, Philadelphia.* See "Life of Richard Henry Lee," Vol. ii, p. 17. Vol. i, p. 313, No. 90.

1778.—*January 2, Chantilly, Va.* See "Life of Richard Henry Lee," Vol. ii, p. 19. Vol. ii, p. 45, No. 14.

1778.—*June 24, York.* See "Life of Richard Henry Lee," Vol. ii, p. 2. Vol. ii, p. 71, No. 21.

WYTHE, GEORGE:

1777.—*October 19, York, in Pennsylvania.* Burgoyne's defeat. Gen. Howe in danger. Speaks of slanders he has been subjected to, in regard to payment of rents. Begs Mr. Wythe to place the matter in clear light before the House.
Vol. ii, p. 3, No. 2.

MISCELLANEOUS LETTERS.

ADAMS, SAMUEL, to DENNYS DEBIRDT, Esq.:

1768.—*May 14, Boston.* See "Life of Richard Henry Lee," Vol. ii, p. 115. Vol. i, p. 25, No. 9.

ADAMS, SAMUEL, to person unknown:

1781.—*January 15, Philadelphia.* See "Life of Richard Henry Lee," Vol. ii, p. 126. Paragraph concerning an unpaid debt of $500, omitted in published letter.
Vol. ii, p. 204, No. 56.

EXTRACTS OF LETTERS PROBABLY FROM SAMUEL CHASE:

1777.—*July 1, Philadelphia.* See "Life of Richard Henry Lee," Vol. ii, p. 181. Vol. i, p. 327, No. 94.

LEE, ARTHUR, to GENERAL WASHINGTON:

1777.—*June 15, Berlin.* See "Life of Arthur Lee," Vol. i, p. 87.
Vol. i, pp. 321, 322, 320, No. 92.

LOVELL, J., to ——:

1778.—*December 10.* See "Life of Richard Henry Lee," Vol. ii, p. 145. Vol. ii, p. 124, No. 34.

LEE, CHARLES, to LORD PIERCY (a copy):

1775.—See "Life of Richard Henry Lee," Vol. i, p. 281. Vol. i, p. 171, No. 50.

LEE, R. H. (?), to GEORGE PYNCHEON and JOHN BRADFORD:

1777.—*October 16, York, Pa.* Arranging for transport of soldiers. Note in different handwriting. Speaks of Mr. Lee's financial straits. Vol. i, p. 351, No. 102.

SHIPPEN, WILLIAM, to HIS BROTHERS:

1776.—See "Life of Richard Henry Lee," Vol. ii, p. 170. Paragraph relating to family matters, omitted in published letters. Vol. i, p. 251, No. 72.

WASHINGTON, GEORGE, to a GENTLEMAN of VIRGINIA:

1787.—*July 19, Philadelphia.* See "Life of Richard Henry Lee," Vol. ii, p. 35. Vol. ii, p. 303, No. 81.

PAPERS OF RICHARD HENRY LEE.

1766 —*July 25, Westmoreland.*—To the Editor of the *Virginia Gazette.* See "Life of Richard Henry Lee," Vol. i, p. 40. Vol. i, p. 11, No. 4.

1766.—R. H. Lee's opinion concerning the authority of the Committee for King George's county. Vol. i, p. 5, No. 2.

1774.—*October 3.* A resolution moved by R. H. Lee concerning the appointing of a militia. See "Life of Richard Henry Lee," Vol. i, p. 112. Vol. i, p. 116, No. 34.

1775.—*May* - . Letter written by R. H. Lee on behalf of the Delegates of the City of London to the Lord Mayor. See "Life of Richard Henry Lee," Vol. i, p. 153. Vol. i, p. 139, No. 41.

LEE, RICHARD HENRY (*continued*):

1776.—*October.* Proposed addition to the instructions given the Commissioners going to France, in R. H. Lee's handwriting. See "Life of Richard Henry Lee," Vol. i, p. 188.
Vol. i, p. 227, No. 65.

1776.—Address to the people of Virginia by Richard Henry Lee. See "Life of Richard Henry Lee," Vol. i, p. 37.
Vol. i, p. 257, No. 74.

1776.—A subscription paper drawn up by R. H. Lee, in testimony to Mr. Sear's patriotism. Signed by nine prominent men. Vol. i, p. 255, No. 73.

1777.—*October 21, Yorktown, in Pennsylvania.* Copy of letter by R. H. Lee for the Committee of Congress to Fort Pitt. Concerning the charges against Col. George Morgan.
Vol. ii, p. 7, No. 3.

OFFICIAL PAPERS.

1766.—*February 27.* Draught by R. H. Lee of the articles of the association by the citizens of Westmoreland. See "Life of Richard Henry Lee," Vol. i, p. 34.
Vol. i, p. 9, No. 3.

1776.—*December 29.* Circular letter to the States, draughted by R. H. Lee. See "Life of Richard Henry Lee," Vol i, p. 187. Extract from *Journal of Congress* on back of manuscript. Vol. i, p. 241, No. 69.

1776.—*December 21, Baltimore.* Letter to the Commissioners. See "Life of Richard Henry Lee," Vol. i, p. 285.
Vol. i, pp. 264, 263, 260, 261, 262, No. 76.

1776.—*December 30, Baltimore.* Letter to the Commissioners. See "Life of Richard Henry Lee," Vol. i, p. 290.
Vol. i, p. 259, No. 75.

1777.—*February 19, Baltimore. Letters to Commissioners in France.* See "Life of Richard Henry Lee," Vol. i, p. 291.
Vol. i, p. 283, No. 82.

OFFICIAL PAPERS (*continued*):

1777.—*April 10, Philadelphia. Letter from a Committee of Congress to General Washington.* See "Life of Richard Henry Lee," Vol. i, p. 284. Vol. i, p. 293, No. 85.

1778.—*Copy of a letter from Congress to the King's Commissioners.* Rejects peace as proffered by Great Britain. Vol. ii, p. 128, No. 36.

PETITIONS.

1774.—*March 26.* Petition to the House of Lords, protesting against the Massachusetts Acts. Signed by Sheriffs of London, Franklin, Izard, William Middleton, Arthur Lee and many others. See "Life of Richard Henry Lee," Vol. i, p. 268. Vol. i, p. 117, No. 35.

1775 —*April 5. Fragments of Petition to the King* (drawn up probably by Arthur Lee,, beseeching him to dismiss certain ministers and advisors. Vol. i, p. 137, No. 40.

1775.—*Petition addressed to the King by the Lord Mayor, Aldermen and Commons of the City of London.* See "Life of Richard Henry Lee," Vol. i, p. 273. Vol. i, p. 175, No. 51. (Not quite finished in the MS.)

Stated Meeting, May 19, 1899.

Present, 27 members.

Vice-President WISTAR in the Chair.

Correspondence was submitted as follows:

A letter from Dr. Samuel G. Dixon, accepting election as a member of the Council.

A letter was also read from Mr. Dunbar D. Scott, asking for information concerning Messrs. Draper and Rittenhouse, former members of the Society.

Mr. W. V. McKean, on behalf of the Phillips Prize Essay Fund Committee, presented a report and submitted a list of names from which judges for the competition were to be selected.

A communication was read from the Special Committee appointed to pass upon Dr. R. Buti's paper "On an Interesting Fragment of the Book of the Dead," recommending the paper for publication in the PROCEEDINGS of the Society.

The death of Edward Goodfellow, of Washington, D. C., was announced.

On motion, the President was requested to appoint a suitable person to prepare an obituary notice of Alexander Biddle, a lately deceased member.

The proceedings of Officers and Council were then submitted.

Pending nominations for membership having been read, the Society proceeded to an election.

The Tellers then reported that, after a scrutiny of the ballots, the following candidates had been duly elected members of the Society:

Arthur V. Meigs, M.D., Philadelphia.
Samuel M. Vauclain, Philadelphia.
Prof. William Ramsay, Ph.D., London, Eng.
Israel W. Morris, Philadelphia.
John Cadwalader, Philadelphia.
Charles E. Dana, Philadelphia.
Prof. Francis C. Phillips, Allegheny, Pa.
Prof. Arthur S. MacKenzie, Ph.D., Bryn Mawr, Pa.
Prof. Joseph P. Remington, Philadelphia.
Prof. William C. Day, Ph.D., Swarthmore, Del. Co., Pa.
William Brooke Rawle, Philadelphia.
Prof. Marion D. Learned, Philadelphia.
Stuart Wood, Philadelphia.
Harrison S. Morris, Philadelphia.
Waldron Shapleigh, Ph.D., Philadelphia.
Prof. William A. Lamberton, Litt.Dr., Philadelphia.
Milton J. Greenman, M.D., Philadelphia.
Rt. Hon. Sir George O. Trevelyan, London.
Henry S. Pritchett, Washington, D. C.
Henri Poincaré, Paris.
James E. Keeler, Sc.D., Mt. Hamilton, Cal.

The Society was then adjourned by the presiding officer.

PROCEEDINGS

OF THE

AMERICAN PHILOSOPHICAL SOCIETY

HELD AT PHILADELPHIA FOR PROMOTING USEFUL KNOWLEDGE.

Vol. XXXVIII. December, 1899. No. 160.

CONTENTS.

PAGE.
Stated Meeting, October 6, 1899 ... 133
Historical Résumé of the Efforts Made to Demonstrate the Practicability of the Reaction Breakwater at Aransas Pass, Tex., with Results to February, 1899. By Lewis M. Haupt (with three plates) ... 135
Genealogical Trees of Butterflies. By A. Radcliffe Grote, A.M. ... 147
Stated Meeting, October 20, 1899 ... 154
Stated Meeting, November 3, 1899 ... 155
Stated Meeting, November 17, 1899 ... 156
Notes on Some Birds of Santa Clara County, California. By John Van Denburgh ... 157
Some Passamaquoddy Witchcraft Tales. By J. Dyneley Prince, Ph.D ... 181
Stated Meeting, December 1, 1899 ... 189
Stated Meeting, December 15, 1899 ... 190
Index ... 193
List of Members ... 197

PHILADELPHIA:
The American Philosophical Society,
104 South Fifth Street.
1899.

It is requested that all correspondence be addressed

To the Secretaries of the
AMERICAN PHILOSOPHICAL SOCIETY,
104 South Fifth Street,
Philadelphia, U. S. A.

Members will please communicate to the Secretaries any inaccuracy in name or address as given on the wrapper of this number.

It is requested that the receipt of this number of the Proceedings be acknowledged to the Secretaries.

Members who have not as yet sent their photographs to the Society will confer a favor by so doing; cabinet size preferred.

PROCEEDINGS

OF THE

AMERICAN PHILOSOPHICAL SOCIETY

HELD AT PHILADELPHIA FOR PROMOTING USEFUL KNOWLEDGE.

VOL. XXXVIII. OCTOBER, 1899. No. 160.

Stated Meeting, October 6, 1899.

Dr. J. CHESTON MORRIS in the Chair.

Present, 8 members.

Correspondence was submitted as follows:

Letters accepting membership were read from Messrs. Arthur V. Meigs, M.D., Henri Poincaré, Charles E. Dana, William Ramsay, Francis C. Phillips, Sir George Otto Trevelyan, Israel W. Morris, A. Stanley Mackenzie, W. A. Lamberton, Waldron Shapleigh, Milton J. Greenman, William C. Day, Samuel M. Vauclain, Harrison S. Morris, Marion D. Learned, Stuart Wood, Henry S. Pritchett, Joseph P. Remington and William Brooke Rawle, and a letter from James E. Keeler declining membership.

A letter from the Connecticut Academy of Arts and Sciences, inviting the appointment of delegates to the commemorative exercises of the one hundredth anniversary of its foundation. The President was authorized to appoint a delegate.

An invitation from the Mayor of Chalon-sur-Saône to send a delegate to the fêtes accompanying the unveiling of the statue of the Egyptologue, François Chabas. On motion the Secretaries were directed to inform the Mayor of Chalon-sur-Saône that the Society had received the invitation too late for its acceptance.

An invitation, also, to the President, from the Committee on the Unveiling of the Monument to Prof. Guiseppe Meneghini, to be present at the ceremony.

A communication from the French Ministry of Commerce, inviting the attendance of the Society during the Exposition of 1900 at a Congress for the Study of Popular Traditions, and enclosing the proposed programme of proceedings. On motion it was resolved that the President be requested to appoint a delegate to represent the Society in the Congress.

A letter from Mr. A. Radcliffe Grote, in regard to a fossil butterfly described by Dr. H. Rebel, of Vienna, which confirms Mr. Grote's theories as to the Papilionides, and stating that in consequence of Mr. Grote's papers published in the *Proceedings* of this Society, Dr. Rebel, in the edition of Dr. Standinger's European catalogue, will retain the Papilionides at the head of the system.

The deaths of the following members of the Society were announced :

Daniel Garrison Brinton, M.D., of Media, Pa., at Atlantic City, N. J., on July 31, 1899.

Mr. Frank Thomson, of Philadelphia, on June 6, 1899.

Sir William Henry Flower, K.C.B., F.R.S., of London, England, aged 68 years, on July 1, 1899.

Mr. William P. Tatham, of Philadelphia, aged 79 years, at Atlantic City, N. J., on August 5, 1899.

Prof. Robert Wilhelm Eberhard Bunsen, of Heidelberg, Germany, aged 89 years, on August 16, 1899.

Hon. Charles P. Daly, of New York, aged 83 years, on September 19, 1899.

W. G. A. Bonwill, D.D.S., of Philadelphia, on September 24, 1899.

On motion of Mr. Prime, it was

Resolved, That the President be requested to appoint gentlemen to prepare memoirs of Messrs. Daniel G. Brinton, M.D., Frank Thomson, William P. Tatham and W. G. A. Bonwill, D.D.S.

The following papers were read:

"Results Secured at Aransas Pass, Tex., by the Reaction Breakwater," by Prof. Lewis M. Haupt.

"Genealogical Trees of Butterflies," by A. Radcliffe Grote.

"Gold in the Glacial Drift of the Adirondacks," by Mr. Frederick Prime.

HISTORICAL RÉSUMÉ OF THE EFFORTS MADE TO DEMONSTRATE THE PRACTICABILITY OF THE REACTION BREAKWATER AT ARANSAS PASS, TEX., WITH RESULTS TO FEBRUARY, 1899.

(Plates VI–VIII.)

BY LEWIS M. HAUPT.

(Read October 6, 1899.)

NECESSITY FOR IMPROVED METHODS.—Inasmuch as this Society has already set its seal of commendation upon a new method proposed nearly thirteen years ago for the alleviation of ocean bars, it becomes a pleasure to complete the record to date by a brief recital of subsequent events. For some years prior to the filing of the theses, for investigation, in the spring of 1887, I was impressed with the serious obstructions and dangers to commerce due to the prevalence of sand bars on alluvial coasts and the unsatisfactory as well as expensive methods in vogue for their improvement.

In fact, the only harbors of importance on our Atlantic and Gulf seaboard which admitted vessels of over seventeen feet draught at M. L. W., south of New York, were Philadelphia, Baltimore, Norfolk, Port Royal, Pensacola and New Orleans, only six in a coast line covering about 3200 miles. The ruling depths on the bars in many of the other inlets was limited to from eight to twelve feet.

The methods of improvement in general use by maritime engineers to-day are the building of two parallel or convergent jetties for the purpose of concentrating the ebb currents upon that portion of the bar included between them and dredging a channel through this protected area, involving large expenditures for construction and maintenance.

HISTORY.—To remove these barriers from our doors a critical examination was made of a large number of special cases both at home and abroad and by comparative studies of local effects, combined with the operation of the general laws of tides and currents, certain deductions were reached as to the causes operating to produce them. These deductions were formulated in the paper entitled "The Physical Phenomena of Harbor Entrances," submitted to the Society in April, and for which there was awarded the highly esteemed Magellanic premium on December 16, 1887.

Encouraged by this substantial recognition of the merits of the invention, I had the honor to submit the plans to the Board of United

States Engineers having general jurisdiction over river and harbor improvements, in January of the following year (1888), with the view to their introduction by the only parties who could use them. The Board, however, made a report on the 16th of March following, concluding in these words: "The views are purely theoretical, are unconfirmed by experience and contain nothing not already well known, which has a useful application in the improvement of our harbors," thus making a direct issue with the conclusions reached by this Society.

On learning of this report, accidentally, some time later and being anxious to confirm "the views" by establishing a precedent, applications were made to several Chiefs of Engineers in succession, on June 30, July 30 and September 14, of 1888, requesting an opportunity to make a demonstration, but without eliciting any response whatever.

This report of the Board was so directly at variance with the conclusions reached by this distinguished Society, and apparently so erroneous as to the observed movement of littoral drift, that a discussion thereof was carefully prepared and read before this Society on January 18, 1889, under the title, "Discussion on the Dynamic Action of the Ocean in Building Bars."[1]

A copy of this paper was likewise mailed to the members of the Board of Engineers, but elicited no reply. On February 24, 1888, the subject was also presented to the Committee on River and Harbor Improvements of the House of Representatives, attracting much interest and close attention, but no action. Thus the efforts to create additional commercial facilities and to demonstrate the truth of a physical law appeared to be thwarted and there remained nothing to do but to await an opportunity.

This did not occur until 1895, or six years later, when the Government decided to concentrate all the appropriations for the West Gulf coast upon the great problem of creating at least one deep-water entrance at Galveston and abandoned the remaining ports to private enterprise.

Then it happened that Mr. George W. Fulton, President of the Coleman-Fulton Pasture Company, and thoroughly familiar with the conditions at Aransas Pass, Tex., from a residence of over fifty years, and Mr. Brewster Cameron, of Tucson, Ariz., succeeded in persuading the Aransas Pass Harbor Company, holding a franchise from Congress, to undertake the construction of a breakwater on this plan, after all previous attempts had failed to secure increased depth.

---

[1] See PROCEEDINGS of March, 1889.

ARANSAS PASS.—It may be well to state just here that this inlet opens into Corpus Christi, Aransas, Copanio and Nueces bays, covering in all about 350 square miles of tidal waters; that the mean range of the tide of the Gulf is but fourteen inches, and that for many years the pass has been drifting southwestwardly at the average rate of 260 feet per year. It is now about 175 miles west of Galveston; is the point farthest west on the Gulf coast of the United States where it is possible to create an inner harbor, without great cost and has consequently a larger extent of tributary territory than any other Atlantic port, with the important collateral of giving the shortest transcontinental haul. Its position is therefore strategic, and but for the lack of sufficient water on the bar it should long since have become the great metropolis of the Gulf. The controlling natural depths were from six to eight feet on the site of the recent bar, while at Galveston they were twelve and one-half feet, which gave the latter place the precedence and caused the termini of the transportation routes to be located at that point.

GOVERNMENT EFFORTS.—The superiority of the more western location, however, led the Government to make several vain attempts to secure a navigable channel at Aransas Pass, and as early as January 13, 1853, Lieut. George B. McClellan reported on the pass which was then some two miles east of its present position, and when, in consequence of its steeper slope and more direct discharge, "the depths were about nine feet, but that the channel was constantly shifting." That was a very different pass from the present one and not comparable with it. Fifteen years later (1869) the citizens of Rockport constructed a short wooden spur dike 600 feet long from the shore of St. Joseph's Island on the north side of the pass, which increased the depth two feet, but which disappeared with the destruction of the dike in a few years by storms.

Surveys were renewed by the Government in 1870–71, but no recommendation to improve was made because of the great expense of building a jetty sufficiently strong to withstand the storms of the Gulf because of the alleged existence of quicksands. This it was said was an "insuperable objection to any such experiment." Nevertheless, after eight years more, or in 1879, it was estimated that a channel twelve feet deep might be secured over the bar by two jetties at a cost of $759,185, and work was actually commenced on this project by the partial construction of the westerly jetty in 1880. The head of Mustang Island was revetted, sand fences built and other work done during the following decade until operations were suspended in May, 1889, after an expenditure of $550,416, with a resulting depth of seven and one-half feet over the bar. In 1887 it was reported to be eight and one-half feet. In the meantime it should be stated that the project was revised in 1887 so as to secure a probable twenty-foot depth. "The original estimated cost of this work as here revised is $2,052,543.72."[1] Work on the Government jetty, which was of mattresses covered with rock, practically ceased about 1885, when it extended seaward including the shore end 5400 feet, and a few years later it was officially reported to have "disappeared," thus confirming the previous opinion as to the difficulties of maintaining such work at that location.

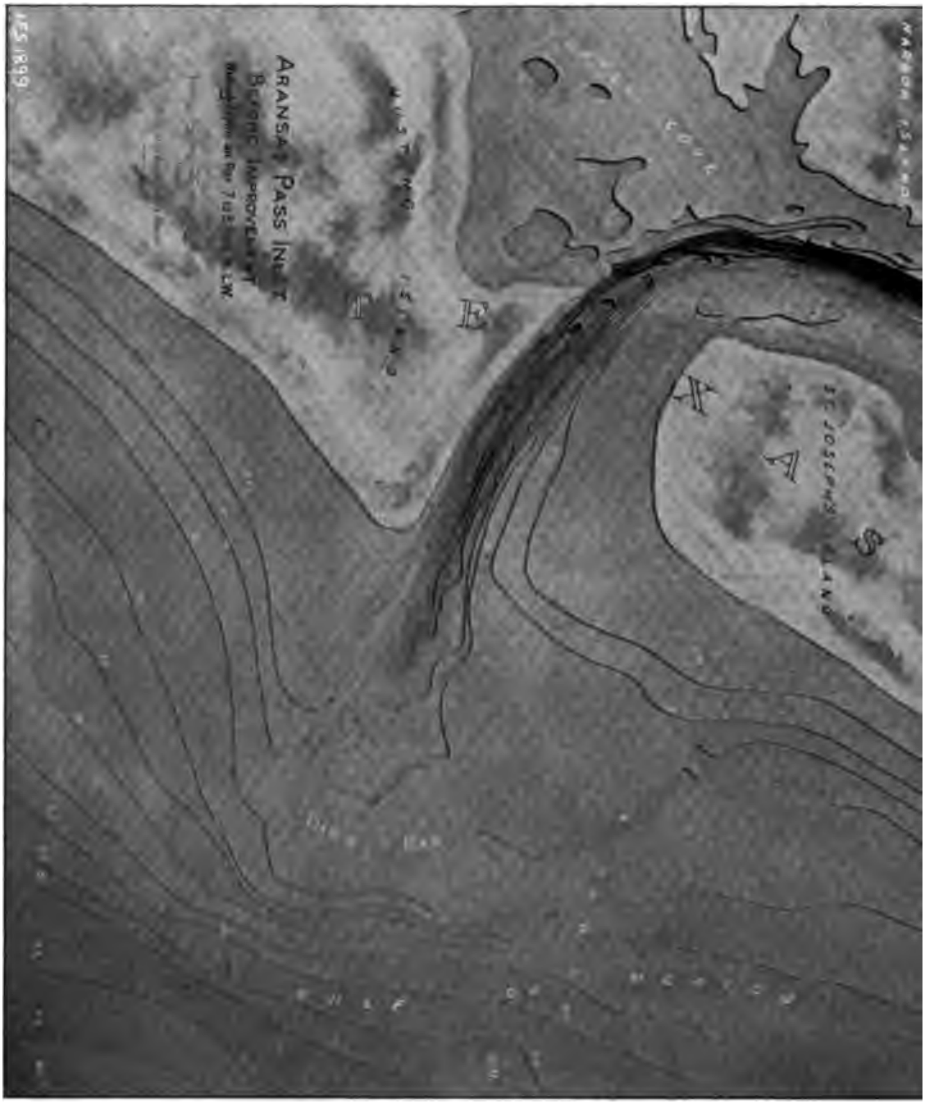
The condition of the bar at the close of the Government work is shown on Plate VI.

PRIVATE EFFORTS.—The years from 1890 to 1895 were spent in experiments by the Harbor Company which was chartered on the 22d day of March, 1890, by the State of Texas, and which secured the passage of an act of Congress, May 12 of the same year, authorizing it to create a twenty-foot channel at Aransas Pass from its own resources. The tribulations of this company and the failure to secure results during the financial depression of those intervening years need not be recorded. Suffice it to say that a contract was made by Mr. Cameron, acting for the Harbor Company, and Charles Clarke & Co., of Galveston, contractors, on the 3d day of July, 1895, to construct only a part of the breakwater on the plans under consideration. The work of placing the foundation mattresses was promptly commenced during the month and vigorously prosecuted. It proceeded so rapidly and was accompanied by such pronounced results that by the end of October it was stated that there were thirteen feet entirely across the bar (see *Report of Board of U. S. Engineers*, Nov. 22, 1897). This without dredging and at an unfavorable season of the year.

UNEXPECTED OBSTRUCTIONS.—It then transpired that the remains of the old Government jetty, which was reported to have "disappeared," were still in place covered with rock, crossing the bed of

---

[1] *Report of Chief Engineer*, 1887, Part ii, p. 1432.



CONDITION OF BAR OFF ARANSAS PASS AFTER SUSPENSION OF GOVERNMENT OPERATIONS IN 1889.
AUTHORITY, U. S. COAST SURVEY.

the channel and intersecting that portion of the curved reaction breakwater then in place about its middle point (see Fig. 2). It thus acted as a submerged mat or retaining wall to prevent further scour, and as the breakwater subsequently rose, by the deposition of rock, to a plane three feet above the surface a perfect *cul de sac* was formed for the accumulation of sand. The Harbor Company was strenuously urged to remove the obstructing jetty, the existence of which was not suspected, as soon as discovered, but as it had made no provision for this unexpected work either financially or in the contract it was not removed. In consequence a shoal formed reaching to within six and one-half feet of the surface.

THE GOODYEAR CONTRACT AND SUSPENSION OF WORK, MAY, 1897.—This so discouraged the Harbor Company that it was willing to enter into a contract, dated September 12, 1896, with Col. C. P. Goodyear, of Georgia, to complete the entire work and furnish the capital as per an amended agreement dated March 11, 1897. Under these contracts Col. Goodyear exploded 23,350 pounds of dynamite on the old Government jetty and channel between December 18, 1896, and May, 1897, by which he blasted out about 500 feet of the old jetty, thus opening a small breach through which the currents could partially escape seaward, but, being unable to secure the payments, which he had every reason to expect, for work done elsewhere, from the Government, he was obliged to surrender this contract, and since that date, May, 1897, absolutely nothing has been done to create a channel. In fact, so discouraged were the residents of southwestern Texas, as well as the company, that it was decided to request the Government to appoint a Board of Engineers to appraise the work done with a view to its reconveyance to its jurisdiction. Such a Board was appointed by the Honorable Secretary of War June 22, 1897, and submitted its report November 22 of the same year, or only about six months after the work of blasting was suspended, yet it reveals some interesting features to which attention is briefly directed.

REPORT OF THE BOARD U. S. ENGINEERS OF 1897.—It states that between October 30 and November 18 there was "only part of one day that satisfactory soundings could be taken on account of the roughness of the water,"[1] and that this examination gave a depth of eight and one-half feet. The map accompanying this report, however, shows a channel having a least depth of nine and one-quarter to nine and one-half feet across the bar, which is believed to be a greater depth than had ever existed on the bar in this its most unfavorable position. The *Report*, moreover, states:

---

[1] *Vide*, p. 3, Doc. 137, H. R., 55th Cong., 2d Session.

"The works built and partially built for the purpose of deepening the channel across this bar have produced no greater depths than were found before these works were constructed."[1]

And again:

"There does not seem any probability that the jetty (meaning breakwater), as now constructed, will of itself secure and maintain any considerable increase of depth in a navigable channel of proper width."[2]

It may seem phenomenal, therefore, that where the eight and one-half feet depth was shown in the chart of November, 1897, there were over twenty-two feet in January, 1899, or an increase of thirteen and one-half feet in a period of as many months, a result which is unprecedented in the annals of harbor improvements, and this without dredging or other assistance, save that derived from the half-completed breakwater reacting upon the partially controlled currents escaping through the breach in the old jetty.

On the other hand, the *Report* states (page 14):

"Since the building of the jetty the position of the channel seems to have become more constant, and, as shown in the following table, the width across the bar to have lessened."

The table referred to shows that between February, 1895, or prior to the beginning of the breakwater, and November, 1897, after work was suspended, the bar had been reduced in width as follows: At the twelve-foot contours the distance across from inside to outside was reduced 550 feet, at the fifteen-foot contours 900 feet, and at the twenty-foot contours by 1600 feet. It is added that "the outside slope has changed but little; . . . . the change has been in the advance of the inner contours." Thus showing that the bar had not advanced seaward, but was eroded on its inner scarp, which is a great desideratum in this class of work. Now, the twelve-foot contours are cut through and but a few hundred feet separate the fifteen-foot contours, if indeed they have not disappeared altogether since the last survey, while there were depths on the bar, under the control of the breakwater, reaching to twenty-three feet in January last, and which are probably greater to-day.

---

[1] *Vide*, p. 16, *supra*.

[2] *Vide*, p. 15, *supra*.

The *Report* also states that the Harbor Company has expended on the breakwater about $250,000, which, with the cost of previous work and other expenses, amounted to about $525,000; and the President of the Harbor Company, Mr. Thomas H. Franklin, of San Antonio, in his report to the Board, dated as early as September 7, 1896, says, *inter àlia,*[1] in summing up:

"Fifth. Sufficient work has already been done at the pass by the company to demonstrate the entire feasibility of obtaining the necessary depth of water by the expenditure of a practically small additional amount, and the Government has therefore had the problem of deep water solved for it at this port."

That this view seems to be accepted in part by the Board of Engineers would appear from its closing remarks, to wit:

> "The Aransas Pass Harbor Company, instead of carrying out the Government plan, adopted one entirely in conflict with it." * * * *

And further:

> "This Board believes that with a careful study of the problem a plan of improvement can be devised that will give for a reasonable cost quite a good entrance in which a channel of navigable width with twenty-foot depth at mean low water can be maintained by the aid of inexpensive dredging. Such a plan would doubtless remove a small part of the curved breakwater and utilize the balance. It would cost less than the approved (?) Government plan, but it would not be so good."

And the *Report* closes with these words:

> "In consideration of all these facts, the Board is of the opinion that the value to the Government of the works of the Aransas Pass Harbor Company for the improvement of Aransas Pass, Texas, is nothing."

THE ARANSAS PASS HARBOR COMPANY SURRENDERS ITS PROPERTY.—In view of this finding of the Board and the urgent desire of the citizens of southwestern Texas to have the work proceed, the Harbor Company generously concluded to transfer all the work on the breakwater to the Government, as a condition precedent to the early prosecution of the work. This was accordingly done on the 27th day of March of this year.

ESTIMATE OF BOARD OF 1898 AND ACTION OF CONGRESS THEREON.—In the meantime, however, the subject was referred back to a Board of Engineers by resolution of the Fifty-fifth Congress, third session, which passed the Senate, May 28, 1898, requesting "the Secretary of War to prepare and submit plans, specifications and estimates for the improvement of the harbor at Aransas Pass, Texas."

---

[1] *Vide*, p. 26.

Two members of the former Board composed the one appointed under this resolution. They reported on December 17, 1898, but the report and estimate were not submitted until the hour of the hearing before the River and Harbor Committee, and then was not read in full. It states that the Board is of the opinion that to secure a 20 foot channel of a width of 150 feet at bottom "it will be advisable to build two parallel jetties and to have recourse to dredging." . . . . Also that "a portion of the old Government jetty and the outer 1000 feet of foundation of the Aransas Pass Harbor Company's jetty must be removed in any case." (See Fig. 1.)

The estimate accompanying this carefully matured plan places the cost of the works at $1,525,000, without provision for maintenance.

Had this plan been adopted it would have destroyed the efficacy of the reaction breakwater almost entirely and would have involved the Government in useless annual expense for maintenance. It was therefore met on the spot by a counter-proposition to complete the existing work as designed, guarantee a twenty-foot channel within two years and secure the Government from loss by filing a large bond of indemnity, conditioned on the payment by the United States of a sum less than one-half the above estimate of the Government's engineers, on the completion of the work. The proposition also included the use of the invention at this place gratis. The committee held it under advisement to be put in legal form, which was subsequently done, but before acting upon it the Government engineers offered to dredge a channel (without guarantees, however, of any kind) for the sum of $100,000. The committee therefore requested my presence when in executive session, and after a brief discussion as to the probable cost of the several parts of the work and the results to be expected therefrom it decided to insert the following item in its bill:

> "Improving Aransas Pass, Texas: For ***dredging and other*** improvement of Aransas Pass Harbor, sixty thousand dollars: *Provided*, That the Secretary of War is hereby authorized to contract for the removal of that portion of the old Government jetty in said harbor from the end nearest the curved jetty constructed by the Aransas Pass Harbor Company to the wreck 'Mary,' in such manner as ***to in no wise interfere with***

the curved jetty now located in said harbor: And provided further, That said contract shall not be let by the Secretary of War, nor said work done, until the said Aransas Pass Harbor Company shall have properly released and surrendered all rights and privileges heretofore granted to it in said harbor by Congress, also the jetty constructed in said harbor."

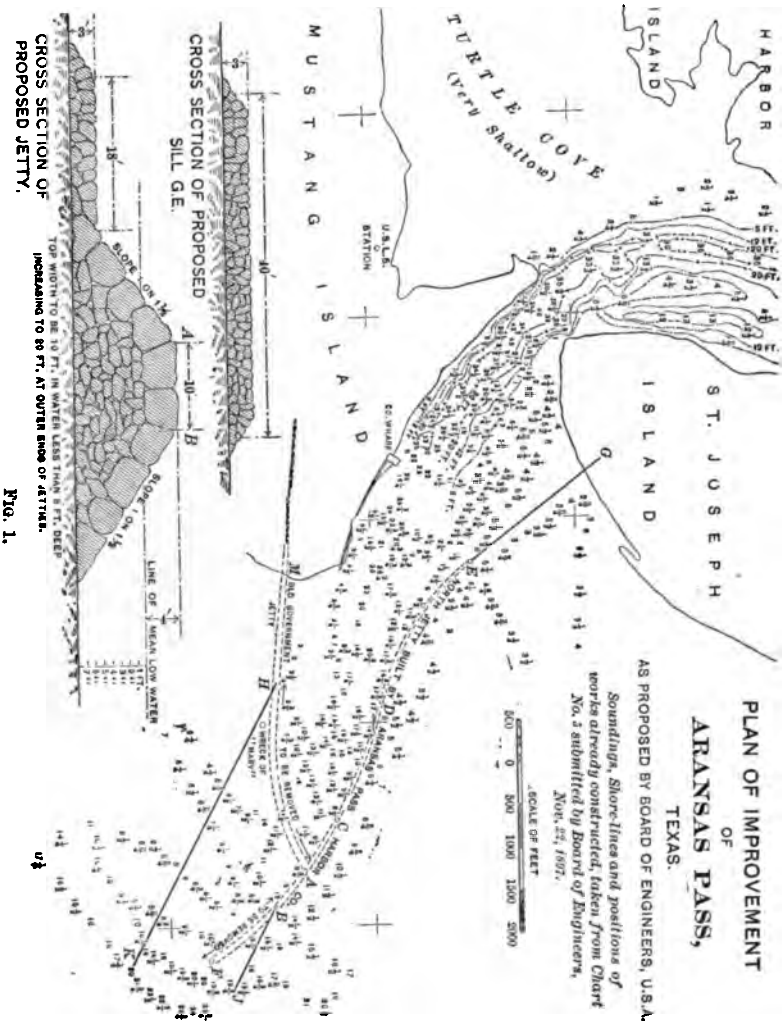

PLAN OF IMPROVEMENT
OF
ARANSAS PASS,
TEXAS.
AS PROPOSED BY BOARD OF ENGINEERS, U.S.A.
Soundings, Shore-lines and positions of works already constructed, taken from Chart No. 1 submitted by Board of Engineers, Nov. 22, 1897.
SCALE OF FEET
500 0 500 1000 1500 2000
HARBOR ISLAND
TURTLE COVE
(Very Shallow)
ST. JOSEPH ISLAND
MUSTANG ISLAND
U.S.L.S. STATION
5 FT.
10 FT.
15 FT.
20 FT.
OLD GOVERNMENT JETTY
JETTY BUILT BY
TO BE REMOVED
WRECK OF "MARY"
A
B
C
D
E
G
H
K
M
CROSS SECTION OF PROPOSED SILL G.E.
CROSS SECTION OF PROPOSED JETTY.
TOP WIDTH TO BE 10 FT. IN WATER LESS THAN 5 FT. DEEP INCREASING TO 20 FT. AT OUTER ENDS OF JETTIES.
SLOPE 1 ON 1½
LINE OF MEAN LOW WATER
3'
10'
18'
40'

FIG. 1.

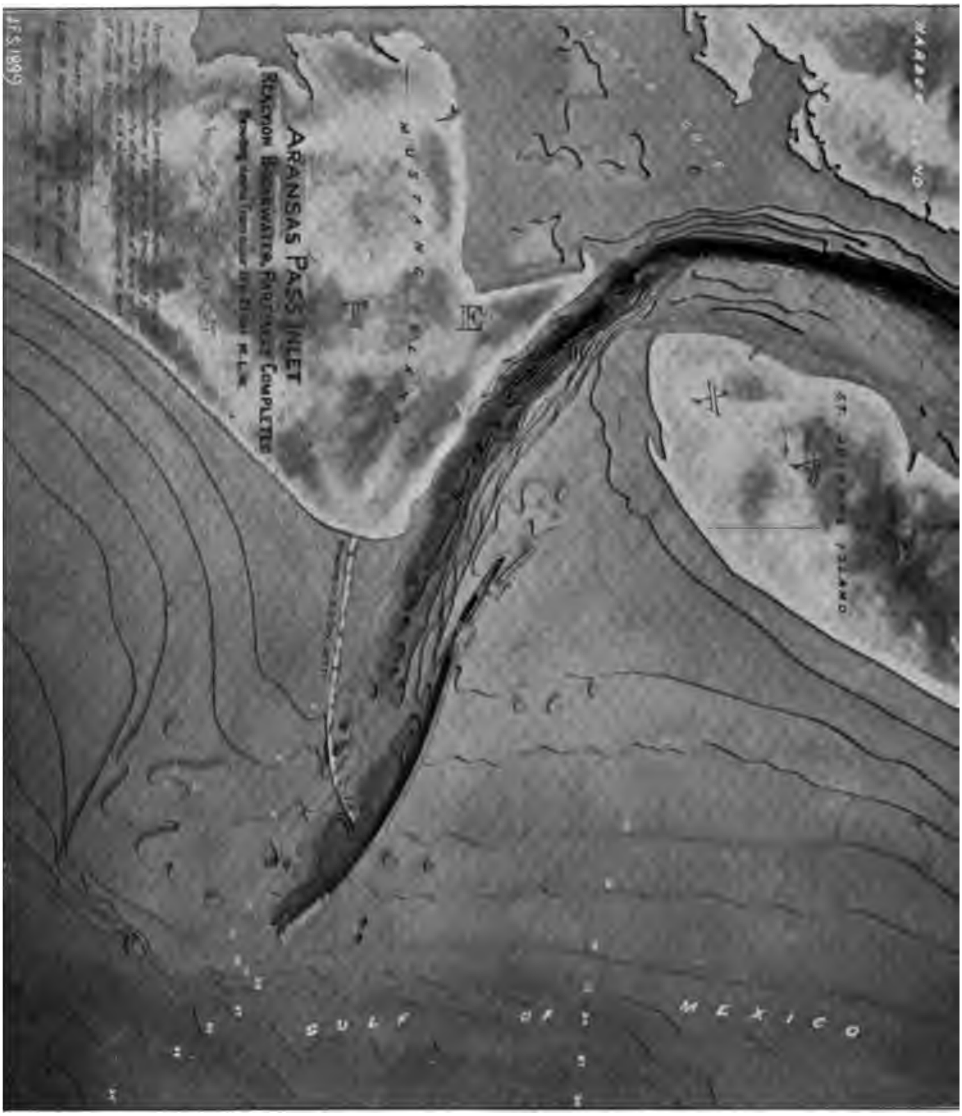
THE PLAN SAVED FROM DESTRUCTION.—Thus the integrity of the invention was preserved for the time being from emasculation, and the Government was saved over $1,000,000 by securing the work done by the Harbor Company, without consideration and by avoiding the unnecessary additional work proposed, the effect of which would have been to obstruct the tidal influx and destroy the natural scour. It should be added that during the consideration of this important subject by both Boards, the Consulting Engineers were given no opportunity to be heard, and did not receive a copy of the reports for months after their presentation to the department.

RESULTS OFFICIALLY REPORTED BY THE COAST SURVEY.—Whilst these matters were pending in Congress last winter the Superintendent of the United States Coast and Geodetic Survey, Dr. Henry S. Pritchett, detailed the survey steamer, "Bache," during January and February to make a detailed hydrographic survey of the bar, but the report thereof showing the remarkable results was not available until the end of June, too late to be of service before Congress.

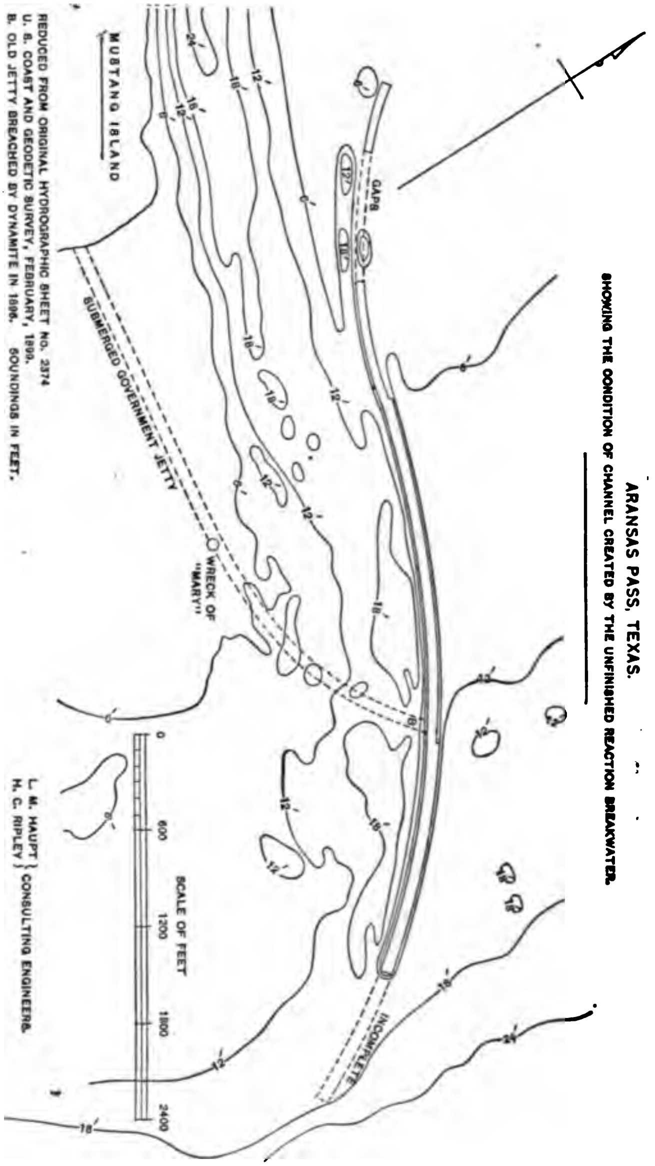
In this report the assistant in charge of the "Bache," Capt. Welker, stated that the weather was so bad as to prevent work on the bar for more than about one day out of each week and also that

> "In 1895 the Aransas Pass Harbor Company constructed a jetty in the shape of the letter 'S,' on the north side of the entrance, which is still in existence, and ever since its construction there has been a marked increase in the depth of water on the bar. The present channel crossed the Mansfield jetty, portions of which are still in existence. An attempt was made to remove this by explosion of dynamite, with the result that the rocks scattered over considerable area and without doubt they prevented the current from scouring the bottom to its full capacity." . . . .
> " It is my opinion that by the completion of the present jetty and the clearing away of the rock in the entrance that a channel of at least twenty feet in depth would soon be secured."

This rapid and progressive deepening of the channel was known in the neighborhood by report of pilots and by the draft of vessels entering the Pass, but does not seem to have merited the attention of the Board in the preparation of its recent plans and estimates. In fact the deepening was so remarkable that many persons were very skeptical as to the facts, and it was therefore necessary to have the official confirmation of the Coast Survey as stated above to verify them.



CONDITION OF BAR AFTER SUSPENSION OF WORK BY THE ARANSAS PASS HARBOR CO.
S. COAST SURVEY, FEB., 1899, SHOWING HALF-COMPLETED BREAKWATER AND OBSTRUCTING, SUBMERGED JETT



ARANSAS PASS, TEXAS.

SHOWING THE CONDITION OF CHANNEL CREATED BY THE UNFINISHED REACTION BREAKWATER.

REDUCED FROM ORIGINAL HYDROGRAPHIC SHEET No. 2374
U. S. COAST AND GEODETIC SURVEY, FEBRUARY, 1899.
B. OLD JETTY BREACHED BY DYNAMITE IN 1896. SOUNDINGS IN FEET.

L. M. HAUPT } CONSULTING ENGINEERS.
H. C. RIPLEY }

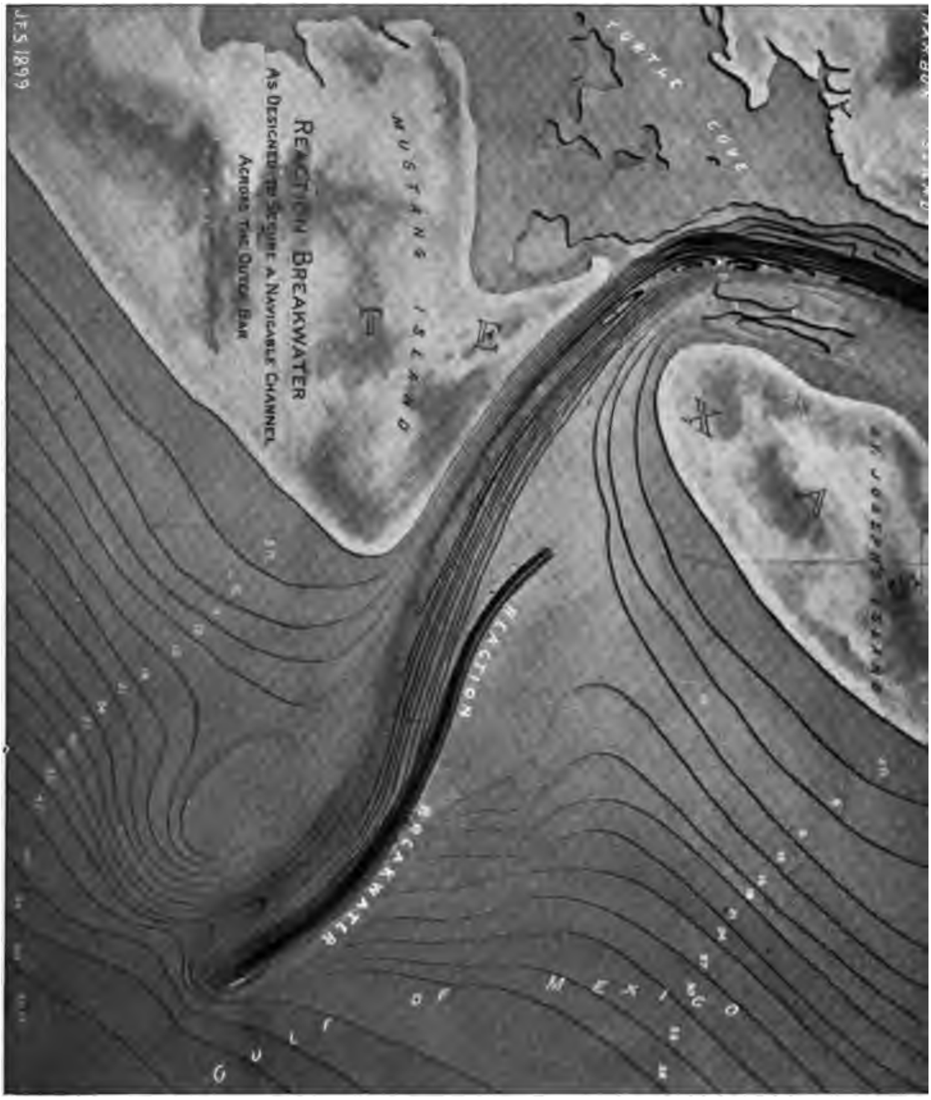
FIG. 2.

THE WORK OF REMOVAL OF THE OBSTRUCTING GOVERNMENT JETTY FINALLY APPROVED AND BIDS INVITED.—The last chapter in this record is brief, for as yet nothing has been done on the work of removing the obstructing jetty. The act was passed at the close of the last session of Congress, March 4, and after careful and intelligent consideration the Government Engineer of the district, Col. C. S. Riché, son of Prof. George I. Riché, late member of this Society, recommended the letting of the work under the appropriation and provisions as made by Congress. It was authorized July 11, and advertised on September 25 for thirty days, when the bids are to be opened, which brings the chronology of events up to the 30th inst. Additional time will be consumed before the preliminaries are complied with. If there be no bidders, the work must be readvertised. In such case no contractor can transfer a plant to the site much before the winter storms begin which involve serious loss of time and increased cost for the Government, or loss to the contractor. Even after the removal of the old jetty time will be required for the currents to adjust themselves to the new regimen and demonstrate their ability to enlarge the channel. These delays therefore will doubtless retard greatly the development of the channel at this important entrance on the West Gulf coast.

THE PROGRESSIVE DEEPENING PRODUCED BY THE BREAKWATER WITHOUT DREDGING OR OTHER AID.—In conclusion it remains only to state that this half completed, single breakwater has so far controlled the ebb currents as to have removed from the channel by their own energy some 400,000 cubic yards of compact, sandy material, and to have produced a progressive improvement of depths, as follows:

	FEET.
August 28, 1896. After suspension of work on breakwater by company	6.0
December 10, 1896. Before old jetty was breached the depth was	6.5
February 2, 1897. During use of dynamite	8.0
June 8, 1897. After work was suspended	8.75
November 5, 1897. Without further aid from any source	9.25
February 5, 1898. An examination with lead line gave	10.0
June 15, 1898. Pilots reported	11.0
August 29, 1898. Pilots reported	12.0

and added, "The S. E. wind this summer did not fill it up as it usually does."



PROBABLE CONDITION OF BAR TO BE EFFECTED BY THE COMPLETION OF THE REACTION BREAKWATE
AND REMOVAL OF OBSTRUCTING JETTY.

	FEET.
January 4, 1899. Telegram announced (on pilot's range)	13.3
February 11, 1899. Capt. Welker wired the Coast Survey office	15.0

ECONOMY AND DEPTHS UNPRECEDENTED.—So that in two years there was a gain of eight feet produced by a half-finished structure in the face of serious obstructions at a cost of less than $30,000 per foot depth as compared with from $200,000 to nearly $900,000 at other places by the usual twin jetty system. It may therefore be safely stated, even without awaiting the completion of the breakwater and the removal of the obstructing jetty, that as our respected Vice-President, Mr. Coleman Sellers, remarked only last evening in referring to the progress of the Mechanic Arts: "Two blades of grass have been made to grow where one grew before." In fact the adage may be carried further, since in this case the half of a blade (jetty) has done what two complete blades (jetties) have never done before in the same time, without dredging, and the American Philosophical Society has evidently not made a mistake of judgment in awarding its highly prized Magellanic premium and medal for this "invention and discovery."

GENEALOGICAL TREES OF BUTTERFLIES.

BY A. RADCLIFFE GROTE, A.M.

(Read October 6, 1899.)

Previous to 1897 the butterflies were generally regarded as monophyletic, springing from a single stem, the family branches being variously arranged by different authors. In classification they were kept together as "Rhopalocera;" and the only exception to this course was the more recently attempted exclusion of the Skippers, the family Hesperiadæ, under an analogous title, equally derived from the Greek, and having reference to the structure of the horns or antennæ. It must be admitted that the reasons given for this were inconclusive, where they were not wholly absent.

From studies of the neuration I was able to announce (February,

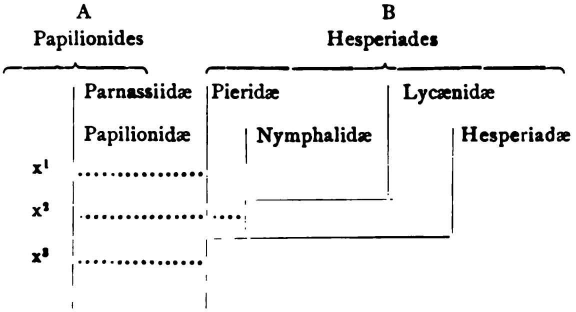
1897) the diphyletism of the diurnals, separating for the first time the Papilionides as a distinct phyletic line from the rest of the butterflies, and keeping these latter together under the title of Hesperiades. It is the Hesperiades alone whose ancestry can be sought for in the Noctuid branch of Dyar's Bombycides (Agrotides), since to this presumptive lineage the Papilionides are apparently alien. For the general pattern of the veining of the Lycæni-Hesperiadæ is repeated in the Agaristid branch of the Bombycides, equally without any indication of affinity with the Papilionid type. With regard to classification and linear succession, it may be said that in the main points I follow Fabricius, in 1787, but it must be said that I give adequate reasons for so doing which were previously wanting.

At the risk of appearing self-assertive, I endeavor to give clearly the original points brought forward by myself in various papers, and to the above statements there must be added, that I have tried to prove that the Blues and the Skippers are directly related, however distant the time may be assumed at which the divergence took place. The interpolation, therefore, between these two groups, of the group of the Swallowtails, by Scudder, Comstock and other observers, would be wholly inadmissible. I show that the points of similarity in structure between the Swallowtails and Skippers, brought forward by Mr. Scudder in 1877, are due to convergence, to that parallelism in development, announced by Milne-Edwards, of which Mr. Scudder appears to take no note, and for which he makes no allowance. Through studies of the Charaxinæ it becomes clear that the hesperid wing, with separated veins, underlies the wings of the group, while a normal evolutionary change in the specialization of the Radius develops in succession the wing of the Blues out of that of the Skippers.

The family Hesperiadæ are then a survival of an ancestral stage in the evolution of the other groups of the Hesperiades, *i. e.*, the Pieridæ, or Whites, the Nymphalids, or brush-footed butterflies, the Lycænids, or Blues. I show, from the fact that a diminution of the internal veins of the hind wings accompanies specialization in other groups of the Lepidoptera (*i. e.*, Saturniades, Tineides), that the Papilionides, or Swallowtails, cannot represent an ancestral phase of any of the other families of the diurnals, because in this respect they are the more advanced group. The assumed generalization of the Papilionides, which has led to the view that they are lower than the other butterflies, would be a mistaken assumption. The opposite view, that the Hesperiades represent ancestral forms of the Papilionides, would be the more tenable, were it not contradicted by the fact that the Papilionides possess an exclusive character in the short, downwardly curved anal vein of the fore wings. The diphyletism of the two groups becomes thus apparent and prevents further comparison. The Papilionides and Hesperiades are parallel developments and neither represents an ancestral stage of the other.

In a review of the genealogical trees of the butterflies hitherto published, it will again make the subject clearer if we commence with the diphyletic tree, first published by me in 1897. I choose here the elementary first sketch, already printed in the PROCEEDINGS OF THE AMERICAN PHILOSOPHICAL SOCIETY for January, 1899, giving dotted lines to show the different points at which it has been presumed that the Papilionid line may have intersected with the Hesperid. In the trees published by me in the *Butterflies of Hildesheim* and in *Natural Science*, I endeavored to intercalate the minor divisions upon this basis. The three culminating family groups, the Parnassiidæ, Pieridæ and Lycænidæ, have, in certain forms, the Radius of the fore wings specialized by the reduction of the branches to four, and sometimes even three in number. In the three lower groups the Radius always remains in a generalized, five-branched condition. Most of the six family groups of butterflies retained have been elsewhere subdivided into families; but, for the sake of simplicity, the names are here used in their older collective sense.

FIG. 1. *Diphyletic genealogical tree of the Butterflies, Grote, 1897.*



EXPLANATION.

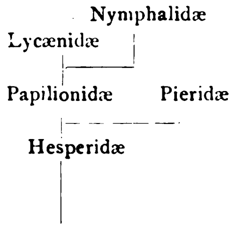
x^1. Dotted line of connection proposed in consequence of analogies of the Papilionides with the brush-footed butterflies. This line is apparently favored by Chapman, 1895, Packard and Quail.

x^2. Dotted line of interconnection indicating that the Papilionides represent an ancestral form of the other butterflies, excluding the Skippers. This line is favored by Scudder, Comstock and others, who place the Papilionides between the Lycænidæ and Hesperiadæ, just above the latter.

x^3. Dotted line of interconnection indicating that the Papilionides represent an ancestral form of *all* the diurnals and that these latter would be monophyletic. I reject *all* the dotted lines, considering the butterflies as diphyletic. The two separated stems, and the arrangement of the collective groups, represent the conclusions to which I have arrived.

I shall now briefly discuss the monophyletic trees published by authors and reproduce two of them. The monophyletic designs published by Scudder (1877) and Reuter (1896) do not differ in principle. In both the brush-footed butterflies are placed "at the head," and the view is expressed that the Papilionides are degraded forms. In addition, Reuter conceives that the Papilionides embrace also the Pieridæ, an old opinion based mainly on coincidence of color between the Parnassians and the Whites and a similarity in pupal suspension. I have endeavored in my writings to expose its fallacy. All methods of pupal suspension in the butterflies are paralleled in other Lepidoptera. The drawings published by Scudder and Reuter are too fanciful or complex to allow of reproduction here.

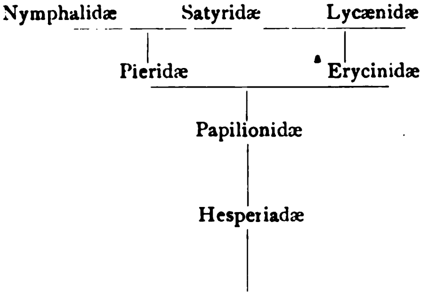
FIG. 2. *Monophyletic tree of the Butterflies, Packard, 1895.*



In this genealogical tree the collective family groups are reduced to five, the Parnassiidæ being fused with the Papilionidæ. A comparison of this tree with Fig. 1 will show that the entire butterflies are intercalated between the Lycænids and Skippers. The ancestors of the Skippers are first imagined to have thrown off the

Pieridæ, these the Swallowtails, these the Nymphalids and again the Blues. The dislocation of the Blues and Skippers is entire and the positions are so reversed that a criticism here would take up too much space. This criticism will, moreover, become apparent upon a comparison with what I have written in these pages and elsewhere. It will be better to pass on to the latest tree published of which I have any knowledge.

FIG. 3. *Monophyletic tree of the Butterflies, Hampson, 1898.*



It is to be presumed that Mr. Meyrick agrees with this classification. There is no entire tree of the butterflies in the *Handbook*, 1895, but the classification agrees with the above, while there are a number of diagrams of the generic branchlets. A study of these show that Mr. Meyrick has not read the meaning of the changes in position of the veins as made out by Comstock and myself. It is characteristic of the genealogies of Meyrick and Hampson, that no reasons for the position of the groups are given in the accompanying text. They cannot thus be subjected to a proper scrutiny, and are, to a great extent, enigmatical. In the above tree the Hesperiadæ, with two internal veins on the hind wings, are placed at the base of the series, in the position of ancestors of the Papilionides, which have only one. This, of itself, would not be incredible. But we are further asked to believe that the Papilionides, with one internal vein, have then given birth to a variety of divergent forms having again two internal veins on the hind wings. This is quite incredible. It may be said that analogous contradictions occur in such of Mr. Meyrick's genealogies as I have carefully examined. It is understood that Mr. Meyrick has paid great attention to the veining of the wings, but in his resultant systems the character is apparently not regarded as crucial.

The object of this communication is attained by this brief review of the genealogical trees of the butterflies in literature. The anomalous position of the Papilionides, assigned to them by Bates, Scudder and the Scandinavian school of writers, has been the principal cause of confusion. In addition, the methods of general zoölogy have been neglected, and this neglect has led to a system of false reasoning, by which the misplacement of the Papilionides has been propped up. To all this has often been added a lack of any serious study of the neuration. The fact that no monophyletic tree of the butterflies will work satisfactorily and stand criticism may be thus explained.

The termination of Superfamily names in *ides* was proposed by F. J. Buckell and adopted by myself in 1895. The names Hesperi[a]des and Papilionides are used by Dr. Chapman as early as April, 1895, but the former name is used for a group containing only the Skippers, while under the latter title all the rest of the diurnals are included. Thus Dr. Chapman's Hesperides equal the Grypocera of continental writers, and his Papilionides their Rhopalocera. This is also the same as the classification by Prof. Comstock in 1893, who gives the English names of Skippers and Butterflies to the two groups, and ventures to say that "if we remove the Hesperidæ (Comstock's Skippers) from the division of the order, as indicated above, the Butterflies form a well-defined group." The classification, however, proposed in my writings is here opposed to both that of Dr. Chapman and of Prof. Comstock, as well as to that of all other authors known to me. The diphyletism of the diurnals is mooted by no other writer and the idea is original with myself.

The Papilionides appear to form a closed group. The Hesperiades appear to be an open group, open to the moths. The Nymphalids, or brush-footed butterflies, form several subparallel converging minor groups and seem properly regarded as an offshoot (monophyletic) from the main stem of the six-footed Hesperiades, which latter culminates in the Pieridæ. The parallelism between Leucophasia and Heliconius supports this view. The Whites show a specialization of the Radius, which the Nymphalids do not, while retaining a more generalized stage of suspension of the chrysalis. The fastening of the latter by the tail alone is copied exceptionally in other groups of the Lepidoptera. Here we again have an inequality of specialization in the secondary (generic) characters of the different stages, an observation made by me originally in 1876, and the correctness of which receives constantly fresh proof as the results of closer studies are published.

When Comstock uses the word "butterfly," he means all the diurnals except the Skippers, the family *Hesperiadæ*. Thus he connects the Papilionides with the other diurnals, including the Blues, and merely regards them as thrown off at an early period. The Papilionides are thus placed at the base of his "butterfly" system, and the Lycænids and Hesperids are divorced, as in Mr. Scudder's arrangement. My course is the very opposite of this. I unite the Skippers with the Blues and connect both with the Nymphalids and Whites (the affinity of which two groups is pointed out by Chapman) under the name *Hesperiades*, and I show that this distinct stem of the Lepidoptera is open to the moths. I then separate the Papilionides as a closed group, having great analogy but no affinity with the rest of the diurnals. The Skippers (*Hesperiadæ*) are really what they appear to be on the surface, an intermediate type between the Lycænids and the moths, assisting in keeping the phylogenetic line open in that direction. But they represent an old and now specialized type, and their proper characters have been made of undue importance by anxious classificators, who have then called them by hard and peculiar names. I try to show that the Skippers are an offshoot of the same main stem which gives us the brush-footed butterflies and the Pierids, from which groups they are not excluded by any character of primary value.

The reversal of the generic arrangement *within* the group of Papilionides is based on neurational features, which prove to me that the Parnassians are more specialized and younger forms. A mere general survey of the group seems to show that this view is reasonable. It must be admitted that *Ornithoptera* is an unusual and original-looking type, compared with the bulk of the diurnals, and one still rich in species in the Australian area. It seems incredible that such a local type should be the offshoot of widely disseminated and more specialized forms of Papilio, to say nothing of the Parnassians. On the other hand, it appears not unreasonable to assume that Ornithoptera-like butterflies should have thrown off the forms of Papilio, many of which retain ornithopteran traits, and to believe that, through dispersal, the suffering of geographic and geologic (climatic) change, the Parnassian types should at length appear. So like the Pierids do the associating Parnassians become, that Mr. Reuter welds them with a nomenclatorial clamp, and Dr. Spuler draws us a radiating figure, from which they equally project (*Zur Stammgeschichte der Papilioniden*, p. 492). Such progeny, so dissimilar in essentials, cannot have had a common womb. But when we examine the pale Parnassian from northern meadows, and the black and gold Ornithopteron from openings in the tropical forest, then the short anal vein on their fore wings reveals in both cases the blood of the Papilionides, the proof of common descent and of a separate origin from the Pierids and the rest of the butterflies. It is Dr. Spuler (*l. c.*) who derives *Ornithoptera* from Papiliolike forms, so that I am totally at variance with this author in my views as to the classification and phylogeny of the Papilionides. While Dr. Spuler regards *Ornithoptera* as an end form, terminating a Papilionid branchlet, I consider it to represent an initial type coming nearer to the primitive form of the diurnal Papilionides.

I have been thus explicit in order to give clearly the radical points of distinction between the classification of the diurnals by any other author and my own.

Stated Meeting, October 20, 1899.

Vice-President SELLERS in the Chair.

Present, 22 members.

Newly elected members, Mr. Stuart Wood, Dr. Arthur V. Meigs and Prof. Remington, were presented to the Chair and took their seats in the Society.

The decease of the following members was announced:

Prof. Edward Orton, of Columbus, O., October 17, 1899, and Prof. Don Mariano Barcena, of the City of Mexico.

Mr. Henry Carey Baird read an obituary notice of the late Col. Alexander Biddle.

Proceedings of Officers and Council were submitted.

Pending nominations for membership having been read, the Society proceeded to an election.

The Curators presented the completed bound volumes of the Curators' Record of Donations, with Index; also, the bound volume of the Curators' Catalogue of Portraits and Busts.

The Tellers reported the election of the following gentlemen as members of the Society:

Prof. William Morris Davis, of Cambridge, Mass.

Russell W. Davenport, of South Bethlehem, Pa.

Mr. Frank Miles Day, of Philadelphia.

The Society was then adjourned by the presiding officer.

Stated Meeting, November 3, 1899.

Vice-President SELLERS in the Chair.

Present, 13 members.

Prof. William A. Lamberton, Mr. Charles E. Dana, and Prof. Marion D. Learned, newly elected members, were presented to the Chair, and took their seats in the Society.

Letters were read from Mr. Frank Miles Day, Prof. William Morris Davis and Mr. John Cadwalader, accepting membership.

From the President, announcing the appointment of Prof. Albert H. Smyth to prepare an obituary notice of the late Dr. Daniel G. Brinton, and from Prof. Smyth, accepting the appointment.

On motion of Dr. Morris, it was ordered that a Committee be appointed to arrange for a meeting in memory of the late Dr. Daniel G. Brinton, and that invitations be authorized to be extended to the learned societies to which Dr. Brinton belonged to participate in the same. The Chair subsequently appointed as the Committee Dr. Morris, Prof. Smyth, Mr. Culin, Mr. Burk and Dr. W. H. Greene.

The list of donations to the Library was laid upon the table, and thanks were ordered therefor.

The decease of the following members was announced :

Prof. Heinrich Kiepert, of Berlin, on April 21, 1899.

Prof. George Rawlinson, Canon of Canterbury.

Prof. George F. Barker presented a report as the delegate of the Society to the Stokes Jubilee at Cambridge, Eng.

Dr. Cleemann moved that translations of papers that have been published already in another language are not eligible for the *Transactions* or *Proceedings*. Adopted.

The Society was then adjourned by the presiding officer.

Stated Meeting, November 17, 1899.

Vice-President **Sellers**, in the Chair.

Present, 16 members.

Mr. L. B. Stillwell, a newly elected member, was presented to the Chair and took his seat in the Society.

A letter was read from Vice-President Sellers, naming as the Brinton Memorial Committee, Messrs. J. C. Morris, A. H. Smyth, S. Culin, J. Y. Burk and W. H. Greene.

The Librarian presented a list of the donations to the Library.

The deaths of Sir Augustus Wollaston Franks, K.C.B., and Dr. Walter J. Hoffman, members of the Society, were announced.

Dr. C. N. Peirce read an obituary notice of Dr. W. G. A. Bonwill.

A communication from J. Dyneley Prince, Ph.D., entitled, "Some Passamaquoddy Witchcraft Tales," was presented.

Also a communication by John Van Denburgh, of Baltimore, Md., entitled "Notes on Some Birds of Santa Clara County, California."

The Society was then adjourned by the presiding officer.

NOTES ON SOME BIRDS OF SANTA CLARA COUNTY, CALIFORNIA.

BY JOHN VAN DENBURGH.

(Read November 17, 1899.)

This paper has been prepared in response to several requests for such notes as I might have on the land birds of Santa Clara county. It is based upon more or less casual observations extending over a period of fourteen years, and makes no pretense to completeness in any way.

Santa Clara county is slightly greater in extent than Rhode Island. Roughly, it may be described as a great valley lying between two mountain ranges. The eastern range rises, in Mount Hamilton, to a height of nearly 4450 feet. The western range is considerably lower. The floor of the valley is made up of the southern marshes of San Francisco bay, parklike expanses of open oak groves, orchards, vineyards and great grain fields. The western mountains, where not already under cultivation, are clothed in chaparral throughout their lower levels, while a fringe of redwoods stands in outline against the sky.

It is at two points in this western range—Los Gatos and Palo Alto—that nearly all my observations have been made. Doubtless many additional species occur in the valley and in the eastern mountains, and it is my hope that other observers will soon complete the list.

Lophortyx californicus. California Quail.

Quail are resident in all parts of the county. During March and early April their calls may be heard almost incessantly, for this is the season of courtship, and even the most bashful of the *debutantes* does not hesitate to reply to the amorous notes of her lovers. At such times the males seem almost devoid of fear, and, if a female be caged, will strut boldly up to her prison door, even though an observer be openly stationed a few feet away. Rival suitors often engage in fierce conflicts, for what is to the female the tenderest of love calls is to another male the sharpest of challenges.

A few coveys often remain as such through the year, but the middle of April finds most of the quail roaming in pairs. Even at this there. The extreme rarity of this owl at Los Gatos is doubtless due to the absence of large trees.

Speotyto cunicularia hypogæa. Burrowing Owl.

This a common resident in many parts of the county. A pair have nested near the same spot on the campus of Leland Stanford Junior University three successive years. In winter one bird may always be seen near this nest burrow (of *Spermophilus*), but I have never seen two there at that season. In this burrow I have found at various times remnants of gophers, meadowlarks and toads.

Glaucidium gnoma californicum. California Pygmy Owl.

Twice, in May, 1898, a Pygmy Owl came at about six in the morning and dashed itself against the wire netting of my bird cage.

Geococcyx californianus. Road-runner.

Road-runners are not very common. I have seen them either at Los Gatos or Palo Alto in every month of the year except January, and have taken their eggs in May. A nest found in a white oak near Los Gatos, May 31, 1888, held four eggs, two of which contained large embryos. This nest was made of oak twigs, lined with weeds and grasses, fifteen feet from the ground. Diameter, twelve inches; height, eight inches; cavity diameter, seven inches; cavity depth, three inches. Another nest, in a cypress near Palo Alto, contained four highly incubated eggs, May 14, 1892.

Ceryle alcyon. Belted Kingfisher.

Kingfishers are sometimes found along the larger streams of the county, where they occasionally breed.

Dryobates pubescens gairdnerii. Gairdner's Woodpecker.

This active little bird is nowhere very common, although seemingly more abundant at Palo Alto than at Los Gatos. A nest in a maple near Los Gatos contained five fresh eggs, May 5, 1890.

Dryobates nuttallii. Nuttall's Woodpecker.

I have seen this bird only on Mount Hamilton, where it is said to breed.

Sphyrapicus varius nuchalis. Red-naped Sapsucker.

A bird which I shot at Palo Alto, February 17, 1893, is, while not typical of this form, much nearer *S. varius nuchalis* than *S. ruber.* It was busy in a small grove of pepper trees when found.

Sphyrapicus ruber. Red-breasted Sapsucker.

My first bird of this species was seen and shot at Los Gatos, November 6, 1892. It was an adult male in high plumage. I saw another at Palo Alto on December 8 of the same year. Two were killed by others during that winter. I have seen none since.

Melanerpes formicivorus bairdi. California Woodpecker.

At Palo Alto this bird is the commonest of its tribe, and numbers of its storage trees may be seen. One large oak at Stanford University contained fully five thousand acorns. All that I examined had been placed, apex inward, in holes which had been drilled just through the bark to the hard wood. Usually but one acorn was placed in a hole, but in some instances several were wedged in together. The holes made by the birds are often very close together. This particular tree has been studded from within about six inches of the ground to about thirty-five feet above it. It has been suggested, perhaps not seriously, that the birds store the acorns in order to procure the larvæ which develop in them. October 2, 1892, I gathered twelve acorns from the lower part of the trunk. Three contained grubs, while the others were sound. November 13, I examined one hundred and fifty acorns. Of fifty taken between the ground and five feet above it, twenty-three were sound, twenty-three contained one grub each, one contained two grubs and three each sheltered three grubs. Of the second fifty, taken between five and ten feet from the ground, forty were sound and ten held grubs. Of the third fifty, taken between ten and fifteen feet from the ground, twenty-two contained grubs. Sixty more were examined on December 11; only twenty-five were sound. Mr. J. M. Stowell examined numbers of the stomachs of these birds at Stanford University and informed me that they contained nothing but bits of acorn.

The birds are very gregarious and noisy. They may be seen in flocks of from six to a dozen or more even during the breeding season.

Melanerpes torquatus. Lewis' Woodpecker.

I have never seen this woodpecker at Los Gatos. It is rare in the oak groves lower in the valley, and is not often seen at Palo Alto.

Colaptes cafer. Red-shafted Flicker.

Flickers are common at all seasons of the year, but are much more abundant in winter than in summer, there seeming to be a considerable immigration of northern birds at this season without a corresponding exodus. With these. northern (?) individuals of *C. cafer* come numerous birds showing more or less *auratus* blood. Some of these are almost true *cafer*, others almost typical *auratus*. One, now in the collection of Leland Stanford Junior University, has the rectrices of one side yellow and shorter than those of the other side, which are red.

These birds nest late in May, and lay usually five, sometimes four or six eggs.

Colaptes auratus luteus. Northern Flicker.

I add this name only on the strength of some of the birds mentioned above. All show traces of *cafer* blood.

Phalænoptilus nuttalli californicus. California Poorwill.

This curious bird may often be seen toward dusk squatted in the dust of the old and less frequented roads of the hill region. Here they may often be followed for a quarter of a mile or more, rising when approached, but alighting again farther on. In August they feed on a gray moth, and when disturbed utter a few quick, short notes very different from their plaintive love call.

Chætura vauxii. Vaux's Swift.

No rule can be given for the coming and going of these birds, whose movements seem to be regulated, if regulated at all, by the abundance of insect food. I have seen them very many times, but find only two dates in my notebooks—Palo Alto, April 27, 1893, and Los Gatos, August 24, 1893. They are usually seen in company with *Tachycineta thalassina*, and I have reason to believe that both breed among the redwoods of Santa Cruz county.

Calypte anna. Anna's Hummingbird.

Anna's hummingbirds are resident throughout the year, though they probably are fewer in winter than at other seasons. One unusually cold winter day I found a male of this species perched on a rafter in a barn and unable to move until warmed in the house, when he flew about seemingly none the worse for his torpor. They sometimes begin to nest in January, and I have found nests containing young birds as late as July 4 (1890). It is probable, therefore, that they raise more than one brood each year. The nests are beautiful structures, often so covered with lichens as to be very well disguised. This is especially apt to be the case when the nests are built in deciduous oaks. Other trees commonly used by these birds for nesting purposes are the live oak, Monterey cypress, pines, bay and eucalyptus. Late in the season they seem to prefer trees growing near or even overhanging running water. I have never seen the males take any part in nest building or in rearing the young. Indeed, they are almost never to be seen near the nests, seeming to prefer to spend their time perched upon an exposed twig in some lonely situation, or in making war upon their fellows. When attacking other birds they usually rise to a considerable height and then drop straight down as if to strike the enemy. When a few inches above the victim, however, they suddenly turn and rise again to the original position, giving vent, at the moment of turning, to a sharp rasping squeak, which has much the same effect on the enemy as the sudden click of a gunlock. In this way they vanquish even the jays.

I once saw two males of this species performing a curious sort of dance. They perched upon dead twigs, perhaps thirty feet apart and about half this distance from the ground, as if about to attack each other. Instead of doing so, however, they continually exchanged places, passing one another without any show of hostility, and meanwhile uttering their peculiar rasping song. This performance was continued during about fifteen minutes.

While feeding from flowers they frequently steady themselves in the air by holding with one or both feet to some twig or leaf. In feeding from certain plants, as the hibiscus, where the tube of the flower is too long to allow of their reaching its base in the ordinary way, these humming birds habitually plunge their bills through the under surface of the corolla near its base. They eat multitudes of small flies, either catching them in the air or, at times, picking them off the bark of trees where they have been attracted by exuding sap.

They are very fond of bathing, and for this purpose usually select a stream so small and shallow that they can stand in the water. Standing thus they dip first one side of the face and then the other in the stream in an indescribably graceful and dainty manner. Having thoroughly soaked themselves they dart to some leafless twig to dry and carefully arrange their feathers. I have never observed them bathing in the spray of fountains.

Selasphorus rufus. Rufous Hummingbird.

This hummingbird seems to be most abundant in February and March when the wild currants are covered with their pink blossoms. It can then almost always be found where these bushes grow. The shriller whir of its wings enables one to distinguish it readily from Anna's hummingbird which is found in the same situations. It is even more pugnacious than the latter species and its nesting season probably is shorter. I have found its nests only in March and April. It usually builds in cypresses, pines, or eucalypti, and its nests are often very beautiful structures, especially when the highly colored stamens of the eucalyptus blossoms are used in their construction.

Tyrannus verticalis. Western Kingbird.

This beautiful flycatcher is abundant in many localities in the valley, but I never have observed it in the foothills west of Los Gatos.

Myiarchus cinerascens. Ash-throated Flycatcher.

I believe that these birds usually arrive at Los Gatos in April, although I observed one February 26, 1889. They begin to nest late in May (May 16, 1890; May 21, 1889; May 24, 1888), and eggs may sometimes be found after the middle of June (June 18, 1889). The number of eggs laid is ordinarily either four or five. The nests are usually built in cavities in oak trees, but a bird-box which I placed in a tree in a barnyard has been used by these flycatchers for the last ten years (1890–1899).

On May 21, 1889, I found a pair of these birds building in a common tin watering-pot hanging in a vine-covered arbor. The nest had just been begun. The first egg was laid May 25, and others were added on each of the next four days. This nest was made chiefly of hair from cows and rabbits, and was so soft that none of the five eggs could be seen in it even when one looked directly down.

Sayornis saya. Say's Phœbe.

Say's Phœbe appears usually in October or November and is not uncommon through the winter.

Sayornis nigricans. Black Phœbe.

This phœbe is common in all parts of the county and, even in the foothills where snow sometimes lies on the ground a few days in winter, is resident throughout the year. It begins to nest early in April, but fresh eggs may sometimes be found in June.

Contopus richardsonii. Western Wood Pewee.

The Western wood pewee is a common summer resident, arriving usually in April and leaving in September, or even late in August. It begins to nest early in June (June 4, 1892).

Empidonax difficilis. Western Flycatcher.

This flycatcher is a very common summer resident and breeds abundantly from May to July (May 4, 1891, to July 4, 1890). Its nests are built in all sorts of situations. One was made of grasses and green moss in some ferns which hung over the bank of a road. Others are made almost entirely of spider-web and placed on beams in low sheds such as cow-stables and hen-houses. The eggs are usually either three or four. The love-call of the male is fée-iss fée-iss, repeated over and over again.

Otocoris alpestris chrysolæma. Mexican Horned Lark.

I have never seen the horned lark at Los Gatos, though it is not rare only a few miles away in the valley.

Pica nuttalli. Yellow-billed Magpie.

This magpie breeds abundantly in the eastern and southern portions of the county, but I have never seen it in the western foothills.

Cyanocitta stelleri frontalis. Blue-fronted Jay.

At Los Gatos these jays are numerous throughout most of the year, but during the breeding season are almost never seen. Probably a few remain to breed in the deeper cañons, while the majority retire to the redwoods of Santa Cruz county. They are able mimics, and imitate perfectly the calls of the red-tailed hawk, quail and several other birds. One, which I kept in a cage with a number of small birds, killed and ate a golden-crowned sparrow.

Aphelocoma californica. California Jay.

These jays are very common and are very destructive to fruit. Their eggs may be found from the middle of March to the middle of May (March 17, 1892, to May 16, 1889). Like the blue-fronted species this jay eats a great many bay-nuts, acorns and almonds. These it carries to some suitable situation, such as a fence rail or the limb of a tree, and, holding them with one foot, deftly cracks them with its bill. I have known it to eat the eggs of Anna's hummingbird, the house finch, the green-backed goldfinch and the brown towhee.

Corvus americanus. American Crow.

I have never seen the crow in this county, but Mr. J. M. Hyde tells me that he has found it near Gilroy, where it probably breeds.

Xanthocephalus xanthocephalus. Yellow-headed Blackbird.

This handsome bird breeds in considerable numbers in the marshes south of San José.

Sternella magna neglecta. Western Meadow Lark.

This was formerly a very common resident in all parts of the valley, but of late years the converting of grain fields into orchards has resulted in a great restriction of its territory. As a songster it is with us probably without an equal, unless the black-headed grosbeak or the California thrasher share its honors. The number of its eggs ranges from four to six. I have found fresh eggs from April 3 (1889) to May 31 (1890). Once in the breeding season, I shot one of these larks which had several wasps in its bill.

Icterus bullocki. Bullock's Oriole.

Bullock's oriole is a common summer resident which breeds abundantly in the valley, but rarely if ever in the foothills west of Los Gatos. It arrives about the middle of April (April 18, 1889; April 16, 1892; April 8, 1893) and begins to nest a week or two later (April 20, 1893). It is seen occasionally after the middle of August (August 17, 1892).

Scolecophagus cyanocephalus. Brewer's Blackbird.

In many parts of the valley these noisy birds breed abundantly in April and May. Most of the nests that I have seen were in live-oak or cypress trees, usually close to water. The usual number of eggs is five, though sometimes only four are found. I believe that only one brood is reared each year. Small flocks remain through the winter.

Carpodacus purpureus californicus. California Purple Finch.

This purple finch is at no time common. Individuals or little companies, however, occur all through the year. I regard them as stragglers from the redwoods near the coast, though some may, perhaps, breed in localities where conifers have been planted.

Carpodacus mexicanus frontalis. House Finch.

The linnet or redhead is probably our most abundant bird in spring and summer, but in winter is outnumbered by certain migratory species, such as the robin and the Zonotrichias. It does great damage to fruit, being especially fond of cherries, peaches and figs. It begins to lay about the middle of April, though eggs may sometimes be found a little earlier (April 9, 1888), and lays one egg each day until the set is complete. The number of eggs varies from three to six, but usually is four or five. I have known three broods to be raised in one nest in one year. Nests of the previous year not infrequently are relined and used, as are also those of other species, such as the brown towhee. The labor of nest building falls entirely on the female, but the male accompanies her on all her trips for material and sings almost constantly with great power and fervor. He, however, takes no part in incubation, and little or none in feeding the young, at least while they remain in the nest.

The following notes show, among other things, the period of incubation :

April 14, 1887. Found a nearly completed nest of the house finch.

April 15, 16. Female continued work on nest.

April 17. One egg.

April 18. Two eggs.

April 19. Three eggs.

April 20. Four eggs.

April 21. Five eggs.

May 3. Four young birds and one egg.

May 4. Five young.

July 14, 1899. House finches began a nest in a vine.

July 15. Nest building was continued.

July 16. Female carrying lining materials. Male always accompanies her, but carries nothing.

July 17. One egg. Female sitting at night.

July 18. Two eggs. Female sitting off and on, it being a very warm day.

July 19. Three eggs. Female sitting intermittently.

July 20. Four eggs.

July 21, 22, 23. Four eggs. Three young birds, probably of an earlier brood, roost at night in the vine with the male.

August 1. Noon: Four eggs. Evening: One egg has hatched.

August 2, 8 A.M. Two eggs and two young. Noon: Same. 6 P.M.: One egg and three young.

August 3. Four young.

August 18. Noon: One young bird on edge of nest, three in nest. Later: Four young in nest. 5 P.M.: One young bird in vine a foot from nest. 6 P.M.: Two young in vine, then back in nest. 7 P.M.: Three of the young have flown to neighboring trees; one is still in vine. Later: All are gone.

On May 4, 1893, I found a nest containing four eggs and a female that evidently had died while sitting. All were cold.

In the spring of 1898 I transferred three young linnets from the nest where they had just hatched to the nest of a pair of domestic canaries whose young were of about the same size. The canaries showed no objection to this sudden addition to their family, and reared all successfully. Late in the summer two of the young linnets began to sing in low tones. To my surprise, their song was entirely copied from that of their foster parent, though of only about half its extent. Early in the summer of 1899, these birds were liberated. Their song then consisted of about one-half of the song of the house finch, followed by several trills from the song of the canary and for several months after this they could be distinguished by it. What finally became of them, I do not know. Birds which have been reared in a cage have the usual red of the plumage replaced with yellow. Caged adults also become yellow after moulting.

Astragalinus tristis salicamans. Willow Goldfinch.

I have not seen this bird at Los Gatos in summer, although it occurs there in considerable numbers in winter. It is not rare at Palo Alto at any season.

Astragalinus psaltria. Green-backed Goldfinch.

This beautiful goldfinch breeds very abundantly in all parts of

the valley which I have visited. That it is also very abundant in winter and early spring may be seen from the following item from my notebook:

"March 21, 1888. Counted seventy-two goldfinches in a large white oak. Probably there were a hundred and fifty in all, mostly *S psaltria*, and the males were in full song, forming a charming chorus for all their lack of leadership."

Nest building begins early in April (March 30, 1889), and fresh eggs may be found as late as the 1st of August (July 31, 1888). The number of eggs laid varies from three to five, but usually is four. Rarely, sets of pure white eggs are found. I found one set of four eggs, of the usual bluish tint, of which one was finely dotted with reddish brown. The nests are built in all sorts of trees and bushes (blackberry, raspberry, grape, maple, orange, apple, peach, oak, fig, bay, greasewood, bamboo, etc.), at heights varying from two to thirty feet.

Astragalinus lawrencei. Lawrence's Goldfinch.

This species is not nearly so common as the green-backed goldfinch, but is by no means rare. It nests in May and June and usually lays five eggs.

Spinus pinus. Pine Siskin.

The siskin usually is a very common bird in winter, though sometimes few are seen. I have not observed it in summer, but Mr. James M. Hyde tells me that a pair nested in Santa Clara several years ago.

Ammodramus sandwichensis bryanti. Bryant's Marsh Sparrow.

I never have noted this bird at Los Gatos, though it is common at Palo Alto, especially in winter.

Chondestes grammacus strigatus. Western Lark Sparrow.

The lark sparrow breeds commonly, throughout the county, in April, May and June. I saw one carrying nesting materials March 22, 1889. The nests are built either on the ground or in trees or bushes. The species does not occur at Los Gatos in winter (arriving in March), but probably is to some extent resident in the lower parts of the valley.

Zonotrichia leucophrys intermedia. Intermediate Sparrow.

This form occurs in some numbers in winter, but is never so

date some of the more enterprising have selected their homes, and, in a few instances, begun to lay (April 19, 1888). The majority, however, wait until nearly a month later.

After the nest has been finished and laying begun, one egg is deposited each morning, with an occasional intermission, until the set is complete. The number of eggs laid varies greatly. I have found incubated sets of from ten to nineteen eggs, and reports of nests containing twenty-five have reached me from reliable farmers. Two pairs kept in captivity during the summer of 1888 laid sixty-six eggs (twenty-five and forty-one).

Single eggs are often found on the ground in places where least expected. This, I believe, is due to indecision on the part of the female, for caged birds deposited several eggs at random before choosing a definite nest. It is not unlikely that nests sometimes receive eggs from more than one female. This certainly is true of caged quail. I have found two nests of ***Pipilo maculatus oregonus*** which contained, besides the usual four eggs of the towhee, one and three quail's eggs respectively.

Sometimes both birds are flushed from the nest, but the duties of incubation usually fall to the lot of the female. A hint of the tragedies that sometimes occur at this time is given in the following items from my notebook:

On May 18, 1898, while clearing away some vines, a quail's nest was discovered in the corner of a chicken-yard. When first shown me this nest contained six eggs and was partially hidden by some dead vines which had been placed over it. May 26: Female sitting on nine eggs. May 27: Female incubating. May 28: The eggs were cold and quail feathers were scattered all about. Evidently the female had been caught and eaten during the night. May 29: The male has taken the female's place on the nest. I fear he will share her fate. May 30: The male's feathers are mingled with those of his mate.

Often, while the female is incubating or has gone on the nest to lay, her mate mounts upon some post or tree nearby and gives vent to his feelings in a metallic call that may be represented by the monosyllable "kayrk." This note, which is repeated drawlingly at frequent intervals, is heard only at this season.

The period of incubation is, to judge from caged birds, twenty-one days. The young often leave the nest before their down has dried, and are from the first gifted with great ability to hide. It is probable that two broods sometimes are reared in a season, for I have found nests containing fresh eggs as late as June 26 (1889).

The very young birds feed, to a great extent, on the seeds of a small grass, which ripen in May and June. Later in the summer various seeds and grains are eaten, and during the autumn and early winter grapes, and then the berries of the California holly form a large part of their diet. In the early spring, after the seeds have sprouted, the quail live almost entirely on the tender leaves of the young weeds which cover the ground. They are very fond of the inner portions of various small bulbs turned up by the plow. A pair made daily visits to a cherry tree during the season of that fruit.

Many of the oaks near Los Gatos contain nests made of twigs by a species of wood-rat. The quail often resort to these when hunted and it is very difficult to get one to leave when once it is thus hidden. On the 16th of May, 1886, I flushed a pair of quail from such a nest, built about eight feet from the ground, and upon climbing to it found it to contain five eggs. Two days later this nest was empty.

Columba fasciata. Band-tailed Pigeon.

This pigeon is a rather common migrant and winter resident, occurring from October 6 (1889) to May 9 (1890). It feeds on the red fruit of the Christmas berry, acorns, oak buds and grain, but rarely descends to the ground. The largest flock, containing between seven hundred and a thousand birds, was observed near Los Gatos in November, 1887. Usually the flocks are composed of from two to three dozen individuals. At Palo Alto they may be found throughout the winter and well on into May.

Zenaidura macroura. Mourning Dove.

A common spring and summer resident, arriving about the end of March. I have found fresh eggs from the first week in May until the last in June. The doves eat large quantities of the shiny black seeds of a sort of "cockscomb" which grows very abundantly in parts of the valley.

Pseudogryphus californianus. California Vulture.

Two vultures seen near Los Gatos are my only records of this species in Santa Clara county.

Cathartes aura. Turkey Buzzard.

Buzzards may be seen at any season of the year, sometimes in large companies. They formerly nested near Los Gatos, and still do so among the redwoods near Boulder creek, Santa Cruz county.

Elanus leucurus. White-tailed Kite.

I have never seen this beautiful hawk near Los Gatos. In the vicinity of San José and Palo Alto, however, it is a common resident, and its nests are not infrequently found. It hunts in pairs throughout the year.

Accipiter velox. Sharp-shinned Hawk.

Sharp-shinned hawks are very abundant in winter, both at Los Gatos and Palo Alto, where they wage ceaseless war on the Juncos and Zonotrichias. One was shot while trying to get at some quail in a trap. I have never observed them in summer.

Accipiter cooperi. Cooper's Hawk.

I have seen but two specimens of this hawk, both at Los Gatos in autumn.

Buteo borealis calurus. Western Red-tail.

This fine hawk is a very common resident in all parts of the county. Measurements of a young bird, which was taken from a nest near Palo Alto, April 30, 1893, and fed upon raw beef, show great rapidity of growth:

May	1,	length	5.86	inches,	extent	7.00	inches,	weight	145	grammes.
"	2,	"	5.90	"	"	7.05	"	"	170	"
"	4,	"	6.50	"	"	7.50	"	"	190	"
"	6,	"	6.75	"	"	8.00	"	"	219	"
"	8,	"	7.25	"	"	8.50	"	"	250	"

This bird was covered with soft down, pure white, except on the top of the head, the scapular and interscapular areas, the dorsal surfaces of the wings, and two bands running forward from each eye to the cere, where the down was slightly tinged with slaty gray. Pinfeathers were just beginning to appear along the sides of the body.

Buteo swainsoni. Swainson's Hawk.

I have never seen this species at Los Gatos. It is not common at Palo Alto, but specimens are occasionally killed.

Aquila chrysætos. Golden Eagle.

In the eastern parts of the valley and in the mountains near Mount Hamilton, this eagle breeds abundantly, but it seems to avoid the western portions of the county, where I have seen it but once, at Los Gatos, in winter.

Falco sparvarius deserticola. Desert Sparrow Hawk.

This is the commonest of our hawks. It is resident in all parts of the valley, and breeds abundantly in the cavities of the white oaks in April and May.

Strix pratincola. Barn Owl.

Barn Owls are very common at Palo Alto and near San José, but are rarely seen at Los Gatos. A nest in a hollow oak near Palo Alto, visited May 13, 1894, contained one egg, three young owls and five gophers. The gophers were arranged in a row at one side of the cavity, their headless necks all directed away from its centre, where the egg and young owls lay.

Asio wilsonianus. Long-eared Owl.

I have seen this owl but once, on Black Mountain, February 18, 1893.

Asio accipitrinus. Short-eared Owl.

A single specimen was killed near Los Gatos in the fall of 1891.

Megascops asio bendirei. California Screech Owl.

This is a resident species, which breeds abundantly in all parts of the county, usually in May.

Bubo virginianus pacificus. Pacific Horned Owl.

This large owl may often be seen toward five or six o'clock in the afternoon of warm, clear days in April and May soaring in pairs or skimming over the fields in search of food. Near Palo Alto the species is quite common and nests in the large oaks which abound in that district. The nest examined May 14, 1892, contained two half-grown young. The following year this pair constructed a nest in a white oak about two hundred yards from that which contained their nest of 1892. This new nest was made of coarse twigs and was partially lined with moss. Its construction occupied the owls about two weeks. When deprived of the two eggs which they laid in this nest the birds returned to the nest of 1892 and laid two

July 18. Two eggs. Female sitting off and on, it being a very warm day.

July 19. Three eggs. Female sitting intermittently.

July 20. Four eggs.

July 21, 22, 23. Four eggs. Three young birds, probably of an earlier brood, roost at night in the vine with the male.

August 1. Noon: Four eggs. Evening: One egg has hatched.

August 2, 8 A.M. Two eggs and two young. Noon: Same. 6 P.M.: One egg and three young.

August 3. Four young.

August 18. Noon: One young bird on edge of nest, three in nest. Later: Four young in nest. 5 P.M.: One young bird in vine a foot from nest. 6 P.M.: Two young in vine, then back in nest. 7 P.M.: Three of the young have flown to neighboring trees; one is still in vine. Later: All are gone.

On May 4, 1893, I found a nest containing four eggs and a female that evidently had died while sitting. All were cold.

In the spring of 1898 I transferred three young linnets from the nest where they had just hatched to the nest of a pair of domestic canaries whose young were of about the same size. The canaries showed no objection to this sudden addition to their family, and reared all successfully. Late in the summer two of the young linnets began to sing in low tones. To my surprise, their song was entirely copied from that of their foster parent, though of only about half its extent. Early in the summer of 1899. these birds were liberated. Their song then consisted of about one-half of the song of the house finch, followed by several trills from the song of the canary and for several months after this they could be distinguished by it. What finally became of them, I do not know. Birds which have been reared in a cage have the usual red of the plumage replaced with yellow. Caged adults also become yellow after moulting.

Astragalinus tristis salicamans. Willow Goldfinch.

I have not seen this bird at Los Gatos in summer, although it occurs there in considerable numbers in winter. It is not rare at Palo Alto at any season.

Astragalinus psaltria. Green-backed Goldfinch.

This beautiful goldfinch breeds very abundantly in all parts of

the valley which I have visited. That it is also very abundant in winter and early spring may be seen from the following item from my notebook:

"March 21, 1888. Counted seventy-two goldfinches in a large white oak. Probably there were a hundred and fifty in all, mostly *S psaltria*, and the males were in full song, forming a charming chorus for all their lack of leadership."

Nest building begins early in April (March 30, 1889), and fresh eggs may be found as late as the 1st of August (July 31, 1888). The number of eggs laid varies from three to five, but usually is four. Rarely, sets of pure white eggs are found. I found one set of four eggs, of the usual bluish tint, of which one was finely dotted with reddish brown. The nests are built in all sorts of trees and bushes (blackberry, raspberry, grape, maple, orange, apple, peach, oak, fig, bay, greasewood, bamboo, etc.), at heights varying from two to thirty feet.

Astragalinus lawrencei. Lawrence's Goldfinch.

This species is not nearly so common as the green-backed goldfinch, but is by no means rare. It nests in May and June and usually lays five eggs.

Spinus pinus. Pine Siskin.

The siskin usually is a very common bird in winter, though sometimes few are seen. I have not observed it in summer, but Mr. James M. Hyde tells me that a pair nested in Santa Clara several years ago.

Ammodramus sandwichensis bryanti. Bryant's Marsh Sparrow.

I never have noted this bird at Los Gatos, though it is common at Palo Alto, especially in winter.

Chondestes grammacus strigatus. Western Lark Sparrow.

The lark sparrow breeds commonly, throughout the county, in April, May and June. I saw one carrying nesting materials March 22, 1889. The nests are built either on the ground or in trees or bushes. The species does not occur at Los Gatos in winter (arriving in March), but probably is to some extent resident in the lower parts of the valley.

Zonotrichia leucophrys intermedia. Intermediate Sparrow.

This form occurs in some numbers in winter, but is never so

abundant as Gambel's sparrow. I believe that a few individuals of the true *leucophrys* occur, but of this I am not positive.

Zonotrichia leucophrys gambeli. Gambel's Sparrow.

Gambel's sparrow usually appears at Los Gatos in September (September 22, 1891) and remains until the end of March (April 1, 1890). It is more abundant at Palo Alto and San José than at Los Gatos.

Zonotrichia coronata. Golden-crowned Sparrow.

Probably the most abundant winter bird at Los Gatos is this handsome sparrow. It usually arrives in September (October 1, 1887; September 22, 1888; September 16, 1889; September 23, 1891; August 31, 1892), and leaves in April (April 3, 1889; April 11, 1892; April 20, 1893). It is common at Palo Alto, but probably less so than the white-crowned varieties.

Spizella socialis arizonæ. Western Chipping Sparrow.

The chipping sparrow is a fairly common resident, breeding usually in May. I saw none in 1892.

Junco hyemalis oregonus. Oregon Junco.

Junco hyemalis thurberi. Thurber's Junco.

Junco hyemalis pinosus. Point Pinos Junco.

A few juncos nest in the chaparral belt near Alma. They appear indistinguishable from the juncos which breed throughout the redwood region of Santa Cruz county, and which I have no hesitation in calling *J. h. pinosus.* This same pale-headed, pink-sided variety occurs during the winter. At this season one finds also dark-headed, pink-sided birds, which I call *J. h. oregonus*, and dark-headed birds, with comparatively little pink, which I refer to *J. h. thurberi.* The juncos usually arrive at Los Gatos in October (October 21, 1887; September 16, 1889), and a few remain until late in April. The October and April birds seem to be mostly *J. h. pinosus.*

Amphispiza belli. Bell's Sparrow.

This bird appears to be of very local distribution in Santa Clara county. I have found it only on a small tract near the summit of the mountains west of Los Gatos. Here a considerable colony breeds every year, but their nests are so well hidden that I have found only one. This was built in a small bush and held three slightly incubated eggs, May 9, 1898. The old birds were feeding their young a kind of yellow spider, June 23, 1892.

Melospiza fasciata samuelis. Samuel's Song Sparrow.

Samuel's song sparrow is a very common resident. It nests in bushes, usually within a foot or two of the ground, though sometimes at a height of more than ten feet. Its three or four eggs may be found from the first week in April (April 4, 1889) to the last of June (June 29, 1889). Very frequently one of the eggs fails to hatch. Discarded snake skins are sometimes used in constructing their nests. This song sparrow daringly enters all sorts of holes and dark corners about woodpiles and under boxes, where no other bird except a wren would think of going.

Melospiza lincolni. Lincoln's Sparrow.

My experience would lead me to believe that Lincoln's sparrow is a rather rare winter visitant, though it may, perhaps, prove to be fairly common in the low-lying portions of the valley. One was shot February 21, 1891.

Passerella iliaca unalaschcensis. Townsend's Sparrow.

This is a common winter resident in the foothills. It usually arrives in October and stays late in March.

Pipilo maculatus oregonus. Oregon Towhee.

To this name I refer the common "black-headed" towhee resident in the foothills west of Los Gatos. It is not typical *oregonus*, but approaches that form far more closely than it does *P. m. megalonyx*. Probably in winter some nearly typical *P. m. oregonus* can be found. What the bird of the eastern side of the valley is I do not know, but I shall not be surprised if it prove much closer *P. m. megalonyx*.

This bird almost invariably builds on the ground, though in a few instances I have found its nest in bushes. Its eggs are usually four, sometimes three, in number, and may be found from late in April (April 24, 1889) until the middle of July (July 11, 1888). April 30, 1888, I found a nest of this bird containing four eggs of the towhee and one of the California quail. Wishing to learn whether the towhee objected to bringing up other people's children, I took leafless twig to dry and carefully arrange their feathers. I have never observed them bathing in the spray of fountains.

Selasphorus rufus. Rufous Hummingbird.

This hummingbird seems to be most abundant in February and March when the wild currants are covered with their pink blossoms. It can then almost always be found where these bushes grow. The shriller whir of its wings enables one to distinguish it readily from Anna's hummingbird which is found in the same situations. It is even more pugnacious than the latter species and its nesting season probably is shorter. I have found its nests only in March and April. It usually builds in cypresses, pines, or eucalypti, and its nests are often very beautiful structures, especially when the highly colored stamens of the eucalyptus blossoms are used in their construction.

Tyrannus verticalis. Western Kingbird.

This beautiful flycatcher is abundant in many localities in the valley, but I never have observed it in the foothills west of Los Gatos.

Myiarchus cinerascens. Ash-throated Flycatcher.

I believe that these birds usually arrive at Los Gatos in April, although I observed one February 26, 1889. They begin to nest late in May (May 16, 1890; May 21, 1889; May 24, 1888), and eggs may sometimes be found after the middle of June (June 18, 1889). The number of eggs laid is ordinarily either four or five. The nests are usually built in cavities in oak trees, but a bird-box which I placed in a tree in a barnyard has been used by these flycatchers for the last ten years (1890–1899).

On May 21, 1889, I found a pair of these birds building in a common tin watering-pot hanging in a vine-covered arbor. The nest had just been begun. The first egg was laid May 25, and others were added on each of the next four days. This nest was made chiefly of hair from cows and rabbits, and was so soft that none of the five eggs could be seen in it even when one looked directly down.

Sayornis saya. Say's Phœbe.

Say's Phœbe appears usually in October or November and is not uncommon through the winter.

Sayornis nigricans. Black Phœbe.

This phœbe is common in all parts of the county and, even in the foothills where snow sometimes lies on the ground a few days in winter, is resident throughout the year. It begins to nest early in April, but fresh eggs may sometimes be found in June.

Contopus richardsonii. Western Wood Pewee.

The Western wood pewee is a common summer resident, arriving usually in April and leaving in September, or even late in August. It begins to nest early in June (June 4, 1892).

Empidonax difficilis. Western Flycatcher.

This flycatcher is a very common summer resident and breeds abundantly from May to July (May 4, 1891, to July 4, 1890). Its nests are built in all sorts of situations. One was made of grasses and green moss in some ferns which hung over the bank of a road. Others are made almost entirely of spider-web and placed on beams in low sheds such as cow-stables and hen-houses. The eggs are usually either three or four. The love-call of the male is fée-iss fée-iss, repeated over and over again.

Otocoris alpestris chrysolæma. Mexican Horned Lark.

I have never seen the horned lark at Los Gatos, though it is not rare only a few miles away in the valley.

Pica nuttalli. Yellow-billed Magpie.

This magpie breeds abundantly in the eastern and southern portions of the county, but I have never seen it in the western foothills.

Cyanocitta stelleri frontalis. Blue-fronted Jay.

At Los Gatos these jays are numerous throughout most of the year, but during the breeding season are almost never seen. Probably a few remain to breed in the deeper cañons, while the majority retire to the redwoods of Santa Cruz county. They are able mimics, and imitate perfectly the calls of the red-tailed hawk, quail and several other birds. One, which I kept in a cage with a number of small birds, killed and ate a golden-crowned sparrow.

Aphelocoma californica. California Jay.

These jays are very common and are very destructive to fruit. Their eggs may be found from the middle of March to the middle of May (March 17, 1892, to May 16, 1889). Like the blue-fronted species this jay eats a great many bay-nuts, acorns and almonds. These it carries to some suitable situation, such as a fence rail or the limb of a tree, and, holding them with one foot, deftly cracks them with its bill. I have known it to eat the eggs of Anna's hummingbird, the house finch, the green-backed goldfinch and the brown towhee.

Corvus americanus. American Crow.

I have never seen the crow in this county, but Mr. J. M. Hyde tells me that he has found it near Gilroy, where it probably breeds.

Xanthocephalus xanthocephalus. Yellow-headed Blackbird.

This handsome bird breeds in considerable numbers in the marshes south of San José.

Sternella magna neglecta. Western Meadow Lark.

This was formerly a very common resident in all parts of the valley, but of late years the converting of grain fields into orchards has resulted in a great restriction of its territory. As a songster it is with us probably without an equal, unless the black-headed grosbeak or the California thrasher share its honors. The number of its eggs ranges from four to six. I have found fresh eggs from April 3 (1889) to May 31 (1890). Once in the breeding season, I shot one of these larks which had several wasps in its bill.

Icterus bullocki. Bullock's Oriole.

Bullock's oriole is a common summer resident which breeds abundantly in the valley, but rarely if ever in the foothills west of Los Gatos. It arrives about the middle of April (April 18, 1889; April 16, 1892; April 8, 1893) and begins to nest a week or two later (April 20, 1893). It is seen occasionally after the middle of August (August 17, 1892).

Scolecophagus cyanocephalus. Brewer's Blackbird.

In many parts of the valley these noisy birds breed abundantly in April and May. Most of the nests that I have seen were in live-oak or cypress trees, usually close to water. The usual number of eggs is five, though sometimes only four are found. I believe that only one brood is reared each year. Small flocks remain through the winter.

Carpodacus purpureus californicus. California Purple Finch.

This purple finch is at no time common. Individuals or little companies, however, occur all through the year. I regard them as stragglers from the redwoods near the coast, though some may, perhaps, breed in localities where conifers have been planted.

Carpodacus mexicanus frontalis. House Finch.

The linnet or redhead is probably our most abundant bird in spring and summer, but in winter is outnumbered by certain migratory species, such as the robin and the Zonotrichias. It does great damage to fruit, being especially fond of cherries, peaches and figs. It begins to lay about the middle of April, though eggs may sometimes be found a little earlier (April 9, 1888), and lays one egg each day until the set is complete. The number of eggs varies from three to six, but usually is four or five. I have known three broods to be raised in one nest in one year. Nests of the previous year not infrequently are relined and used, as are also those of other species, such as the brown towhee. The labor of nest building falls entirely on the female, but the male accompanies her on all her trips for material and sings almost constantly with great power and fervor. He, however, takes no part in incubation, and little or none in feeding the young, at least while they remain in the nest.

The following notes show, among other things, the period of incubation :

April 14, 1887. Found a nearly completed nest of the house finch.

April 15, 16. Female continued work on nest.
April 17. One egg.
April 18. Two eggs.
April 19. Three eggs.
April 20. Four eggs.
April 21. Five eggs.
May 3. Four young birds and one egg.
May 4. Five young.

July 14, 1899. House finches began a nest in a vine.
July 15. Nest building was continued.

July 16. Female carrying lining materials. Male always accompanies her, but carries nothing.

July 17. One egg. Female sitting at night.

July 18. Two eggs. Female sitting off and on, it being a very warm day.

July 19. Three eggs. Female sitting intermittently.

July 20. Four eggs.

July 21, 22, 23. Four eggs. Three young birds, probably of an earlier brood, roost at night in the vine with the male.

August 1. Noon: Four eggs. Evening: One egg has hatched.

August 2, 8 A.M. Two eggs and two young. Noon: Same. 6 P.M.: One egg and three young.

August 3. Four young.

August 18. Noon: One young bird on edge of nest, three in nest. Later: Four young in nest. 5 P.M.: One young bird in vine a foot from nest. 6 P.M.: Two young in vine, then back in nest. 7 P.M.: Three of the young have flown to neighboring trees; one is still in vine. Later: All are gone.

On May 4, 1893, I found a nest containing four eggs and a female that evidently had died while sitting. All were cold.

In the spring of 1898 I transferred three young linnets from the nest where they had just hatched to the nest of a pair of domestic canaries whose young were of about the same size. The canaries showed no objection to this sudden addition to their family, and reared all successfully. Late in the summer two of the young linnets began to sing in low tones. To my surprise, their song was entirely copied from that of their foster parent, though of only about half its extent. Early in the summer of 1899. these birds were liberated. Their song then consisted of about one-half of the song of the house finch, followed by several trills from the song of the canary and for several months after this they could be distinguished by it. What finally became of them, I do not know. Birds which have been reared in a cage have the usual red of the plumage replaced with yellow. Caged adults also become yellow after moulting.

Astragalinus tristis salicamans. Willow Goldfinch.

I have not seen this bird at Los Gatos in summer, although it occurs there in considerable numbers in winter. It is not rare at Palo Alto at any season.

Astragalinus psaltria. Green-backed Goldfinch.

This beautiful goldfinch breeds very abundantly in all parts of

the valley which I have visited. That it is also very abundant in winter and early spring may be seen from the following item from my notebook :

"March 21, 1888. Counted seventy-two goldfinches in a large white oak. Probably there were a hundred and fifty in all, mostly *S psaltria*, and the males were in full song, forming a charming chorus for all their lack of leadership."

Nest building begins early in April (March 30, 1889), and fresh eggs may be found as late as the 1st of August (July 31, 1888). The number of eggs laid varies from three to five, but usually is four. Rarely, sets of pure white eggs are found. I found one set of four eggs, of the usual bluish tint, of which one was finely dotted with reddish brown. The nests are built in all sorts of trees and bushes (blackberry, raspberry, grape, maple, orange, apple, peach, oak, fig, bay, greasewood, bamboo, etc.), at heights varying from two to thirty feet.

Astragalinus lawrencei. Lawrence's Goldfinch.

This species is not nearly so common as the green-backed goldfinch, but is by no means rare. It nests in May and June and usually lays five eggs.

Spinus pinus. Pine Siskin.

The siskin usually is a very common bird in winter, though sometimes few are seen. I have not observed it in summer, but Mr. James M. Hyde tells me that a pair nested in Santa Clara several years ago.

Ammodramus sandwichensis bryanti. Bryant's Marsh Sparrow.

I never have noted this bird at Los Gatos, though it is common at Palo Alto, especially in winter.

Chondestes grammacus strigatus. Western Lark Sparrow.

The lark sparrow breeds commonly, throughout the county, in April, May and June. I saw one carrying nesting materials March 22, 1889. The nests are built either on the ground or in trees or bushes. The species does not occur at Los Gatos in winter (arriving in March), but probably is to some extent resident in the lower parts of the valley.

Zonotrichia leucophrys intermedia. Intermediate Sparrow.

This form occurs in some numbers in winter, but is never so

abundant as Gambel's sparrow. I believe that a few individuals of the true *leucophrys* occur, but of this I am not positive.

Zonotrichia leucophrys gambeli. Gambel's Sparrow.

Gambel's sparrow usually appears at Los Gatos in September (September 22, 1891) and remains until the end of March (April 1, 1890). It is more abundant at Palo Alto and San José than at Los Gatos.

Zonotrichia coronata. Golden-crowned Sparrow.

Probably the most abundant winter bird at Los Gatos is this handsome sparrow. It usually arrives in September (October 1, 1887; September 22, 1888; September 16, 1889; September 23, 1891; August 31, 1892), and leaves in April (April 3, 1889; April 11, 1892; April 20, 1893). It is common at Palo Alto, but probably less so than the white-crowned varieties.

Spizella socialis arizonæ. Western Chipping Sparrow.

The chipping sparrow is a fairly common resident, breeding usually in May. I saw none in 1892.

Junco hyemalis oregonus. Oregon Junco.

Junco hyemalis thurberi. Thurber's Junco.

Junco hyemalis pinosus. Point Pinos Junco.

A few juncos nest in the chaparral belt near Alma. They appear indistinguishable from the juncos which breed throughout the redwood region of Santa Cruz county, and which I have no hesitation in calling *J. h. pinosus.* This same pale-headed, pink-sided variety occurs during the winter. At this season one finds also dark-headed, pink-sided birds, which I call *J. h. oregonus,* and dark-headed birds, with comparatively little pink, which I refer to *J. h. thurberi.* The juncos usually arrive at Los Gatos in October (October 21, 1887; September 16, 1889), and a few remain until late in April. The October and April birds seem to be mostly *J. h. pinosus.*

Amphispiza belli. Bell's Sparrow.

This bird appears to be of very local distribution in Santa Clara county. I have found it only on a small tract near the summit of the mountains west of Los Gatos. Here a considerable colony breeds every year, but their nests are so well hidden that I have found only one. This was built in a small bush and held three slightly incubated eggs, May 9, 1898. The old birds were feeding their young a kind of yellow spider, June 23, 1892.

Melospiza fasciata samuelis. Samuel's Song Sparrow.

Samuel's song sparrow is a very common resident. It nests in bushes, usually within a foot or two of the ground, though sometimes at a height of more than ten feet. Its three or four eggs may be found from the first week in April (April 4, 1889) to the last of June (June 29, 1889). Very frequently one of the eggs fails to hatch. Discarded snake skins are sometimes used in constructing their nests. This song sparrow daringly enters all sorts of holes and dark corners about woodpiles and under boxes, where no other bird except a wren would think of going.

Melospiza lincolni. Lincoln's Sparrow.

My experience would lead me to believe that Lincoln's sparrow is a rather rare winter visitant, though it may, perhaps, prove to be fairly common in the low-lying portions of the valley. One was shot February 21, 1891.

Passerella iliaca unalaschcensis. Townsend's Sparrow.

This is a common winter resident in the foothills. It usually arrives in October and stays late in March.

Pipilo maculatus oregonus. Oregon Towhee.

To this name I refer the common "black-headed" towhee resident in the foothills west of Los Gatos. It is not typical *oregonus*, but approaches that form far more closely than it does *P. m. megalonyx*. Probably in winter some nearly typical *P. m. oregonus* can be found. What the bird of the eastern side of the valley is I do not know, but I shall not be surprised if it prove much closer *P. m. megalonyx*.

This bird almost invariably builds on the ground, though in a few instances I have found its nest in bushes. Its eggs are usually four, sometimes three, in number, and may be found from late in April (April 24, 1889) until the middle of July (July 11, 1888). April 30, 1888, I found a nest of this bird containing four eggs of the towhee and one of the California quail. Wishing to learn whether the towhee objected to bringing up other people's children, I took her four eggs, leaving only the quail's egg in the nest. The next day the towhee was still sitting, though it cannot be supposed that she was unable to detect the great difference in size, color and shape between this egg and her own. The next year (May 17, 1889) I found a nest of this species containing the usual four towhee's eggs and two quail's eggs, in addition to which there was a third quail's egg on the ground about six inches from the nest. The towhee was sitting.

Pipilo fuscus crissalis. California Towhee.

This is a very common resident. The birds apparently remain paired through the year. Nesting begins about the middle of April (April 16, 1889), and young birds may sometimes be found still in the nest in September (September 3, 1899). The number of eggs usually is three or four, and one is laid each day until the set is complete. The period of incubation is fourteen days.

Oreospiza chlorura. Green-tailed Towhee.

One was shot in a river bottom near San José during the winter of 1889 or 1890.

Zamelodia melanocephala. Black-headed Grosbeak.

This grosbeak must be ranked among the very finest of our songsters. The song begins with a series of loud, clear notes, delivered, at considerable intervals, in a more or less declamatory style. These are followed at length by runs and trills fully as tender and liquid as the notes of a thrush, and quite as well executed as those of a well-trained canary. This song is repeated over and over again, almost without a pause. One that I timed sang nearly twelve minutes, with never a pause of more than ten seconds. This grosbeak arrives about the middle of April (April 16, 1890; April 15, 1892), and comparatively few remain until September. Nest building usually begins early in May, but the last of the young sometimes remain in the nest until the middle of July (July 12, 1888). The males assist in the duties of incubation.

Cyanospiza amœna. Lazuli Bunting.

This species arrives about the middle of April—the males always, I believe, coming a day or two before the females—and begins to build about the end of that month. I have found fresh eggs from May 1 to June 23 (1888). Occasionally the eggs are dotted with brown. The number laid is ordinarily either three or four. A caged male often sang until nine or ten o'clock at night during the breeding season, though in the dark.

Piranga ludoviciana. Louisiana Tanager.

This beautiful bird occurs only as a migrant—during April and May and again in August and September. At these times it is fairly common. Last seen in spring, May 29 and 30, 1898.

Progne subis hesperia. Western Martin.

The martin breeds in some numbers on the Mount Hamilton range. I have not noted it on the west side of the county.

Petrochelidon lunifrons. Cliff Swallow.

This is a very common summer resident, appearing at Palo Alto about the middle of March (March 14, 1892), though it usually does not reach Los Gatos much before April. It breeds in June.

Hirundo erythrogaster. Barn Swallow.

For some years a colony nested at Alma.

Tachycineta bicolor. Tree Swallow.

Along the western side of the county this swallow breeds quite abundantly in holes in white oaks.

Tachycineta thalassina. Violet-green Swallow.

This gorgeous bird is an irregular summer visitant, probably from the redwood region nearer the coast. I have no knowledge of its breeding in Santa Clara county.

Stelgidopteryx serripennis. Rough-winged Swallow.

A number of these birds breed near San José.

Ampelis cedrorum. Cedar Waxwing.

This waxwing is an occasional winter visitant. I have seen none for several years.

Lanius ludovicianus gambeli. California Shrike.

This is a common resident of the valley. I have not found it breeding in the foothills west of Los Gatos, though it is frequently seen there after the nesting season is over. On September 3, 1892, I observed one perched in the top of a cherry tree, singing very sweetly and with much power.

Vireo gilvus. Warbling Vireo.

It is usually early in April that this vireo arrives at Los Gatos. By the middle of that month it becomes common, and a little later nest building begins (April 18, 1890; April 27, 1889). Its eggs are usually four, sometimes only three, and may be found throughout May and the greater part of June (April 26, 1890; June 20, 1889).

Vireo huttoni. Hutton's Vireo.

This is a fairly common winter resident near Los Gatos. I believe it retires to the coast to breed.

Helminthophila celata lutescens. Lutescent Warbler.

It usually is not until about the 1st of April that this warbler becomes common, although individuals arrive a week or two earlier. In this vicinity their nests seem always to be built upon the ground, and those of several years often are not more than a few inches apart. Nestlings may be found from the last week in April until the end of June (April 25–June 30, 1889). Four or five eggs are laid.

Dendroica æstiva. Yellow Warbler.

This is a common summer resident and breeds abundantly, especially on the floor of the valley, in June.

Dendroica auduboni. Audubon's Warbler.

This warbler occurs in large numbers, from October on through the winter. It is most frequently seen in companies, often with the western bluebird and the various goldfinches, and feeds, to some extent, on grapes.

Dendroica townsendi. Townsend's Warbler.

A few specimens of this warbler have been taken at Santa Clara by Mr. J. M. Hyde. I regard them as stragglers from the redwood region near the coast, where this bird is common during migrations.

Geothlypis tolmiei. Tolmie's Warbler.

I have only one record of this warbler. On May 17, 1890, I came upon a fine male in the foothills west of Los Gatos. Seven days later, in the same place, I saw both male and female carrying food. Doubtless they had a nest, but careful search failed to reveal it.

Geothlypis trichas occidentalis. Western Yellow-throat.

A number of these birds breed in the marshes south of San José.

Icteria virens longicauda. Long-tailed Chat.

This beautiful bird is not uncommon along the watercourses, but is so shy that it is rarely seen. It nests in May and June.

Anthus pensilvanicus. American Pipit.

This larklike bird is a very abundant winter resident, arriving usually in October.

Cinclus mexicanus. American Dipper.

One not infrequently meets this bird when wandering along streams in the rougher parts of the county, though it does not breed here in nearly such numbers as among the redwoods of Santa Cruz county.

Minus polyglottos. Mockingbird.

On February 17, 1893, I shot a male mockingbird that had been living for some weeks in a small grove of peppers and cypresses near Stanford University. This is the only one I have seen. It bore no evidence of having been caged.

Harporhynchus redivivus. California Thrasher.

This common resident begins nest building usually in the first week in April. Its eggs—which sometimes are without markings—vary from two to four in number and may be found from the middle of April until the middle of May. The song is clear and powerful, and so frequently includes snatches from the songs and calls of other birds (among which are the flicker, housefinch, quail, goldfinch, black-headed grosbeak, etc.) that this species is often spoken of as the mountain mockingbird.

Thryomanes bewickii spilurus. Vigor's Wren.

Vigor's wren is a resident species, very common in winter and moderately common in summer. I have found fresh eggs as late as June 18 (1890).

Troglodytes aëdon parkmanii. Parkman's Wren.

The earliest of these wrens usually arrive at Los Gatos about the middle of March. By the end of that month they are common and in full song (during 1896 and 1897 I saw none). Nest building begins during the second half of April. I have found its five to eight eggs from May 9 to June 6 (1890).

Cistothorus palustris paludicola. Tule Wren.

The tule wren breeds in the marshes south of San José, but not very abundantly.

Parus inornatus. Plain Tit.

It can hardly be said that this tit is common at Los Gatos even in winter, though it is seen much more frequently then than during the breeding season. At Palo Alto, and probably in the oak region throughout the valley, it is a very common resident. It has, perhaps, a greater variety of notes than any other of our birds. Its eggs, usually, are seven, and are to be found in April. Occasionally, the nests are built in bird boxes.

Parus rufescens neglectus. California Chickadee.

In the coniferous woods southeast of Saratoga this chickadee is a very common resident and undoubtedly breeds. Straggling flocks occur irregularly near Los Gatos during nearly the whole year, but never are common.

Chamæa fasciata. Wren Tit.

This is a very common resident of the chaparral belt, where its curiously rattlelike call may be heard almost constantly. Its song is a series of beautifully clear whistled notes delivered at constantly lessening intervals, so that it has much the cadence of an ivory ball dropped on a slab of stone. Nest building begins about the middle of April (April 12, 1890) and fresh eggs may be found until late in June (June 20, 1889). Three to five eggs are laid, most frequently four.

Psaltriparus minimus californicus. California Bush Tit.

This is a very common resident. Nest building sometimes begins as early as the middle of February, but usually not until a month later. The nests vary in length from six and one-half inches to more than a foot. Their construction occupies the birds from one to three weeks (extremes are April 5–11; March 16–April 10), depending chiefly upon the abundance of material. Full sets contain from two to eight eggs, and may be found as late as June 16

(1888). When the eggs are taken the birds often remove the nest, bit by bit, to a new location. The following notes show that two broods are reared in the same nest:

April 24, 1888: Found bush tit's nest in live oak, ten feet from ground. May 4: After cutting the nest down and finding that it held five young birds, I tied it in place again. May 12: Young still in nest. June 16: Thinking the nest deserted I again cut it down, was surprised to find five eggs. The birds had stopped up the original hole, made another lower down, and relined the nest.

April 5, 1889. Bush tit's nest in live oak, nine feet from ground. Six young. April 21: Nest empty. April 27: Six eggs. April 28: Seven eggs. April 30: Eight eggs.

Regulus satrapa olivaceus. Western Golden-crowned Kinglet.

This kinglet is a rare winter visitant.

Regulus calendula. Ruby-crowned Kinglet.

This is a very common winter resident, arriving, ordinarily, in October and remaining until March or April.

Myadestes townsendii. Townsend's Solitaire.

A female shot at Los Gatos, February 11, 1893, is the only one observed.

Hylocichla ustulata œdica.

This is a very common summer resident, arriving in April and remaining until September (Mar. 24, 1899–Sep. 3, 1892). It nests very abundantly along watercourses, chiefly in June.

Hylocichla aonalaschkæ. Dwarf Hermit Thrush.

The dwarf thrush is extremely common from late in October (Nov. 7, 1888, Oct. 20, 1899, Oct. 30, 1891, Oct. 22, 1892) until after the thrushes of the *ustulata* type have appeared in the spring. I believe it does not nest in Santa Clara county, although it does among the redwoods a few miles farther west.

Merula migratoria propinqua. Western Robin.

The robin is a common migrant and winter resident, appearing usually in October (Oct. 16, 1887, Nov. 3, 1888, Oct. 9, 1889, Oct. 30, 1891) and remaining until the latter part of March (Mar. 21, 1888; Mar. 24, 1889). One appeared at Los Gatos August 8, 1893, and was seen almost daily until September 10. In November and December, 1889, immense flocks passed southward, almost without intermission for days at a time.

Hesperocichla nævia. Varied Thrush.

It usually is not until several weeks after the arrival of our other winter birds that the varied thrush appears at Los Gatos (Jan. 5, 1889; Dec. 24, 1889; Dec. 9, 1893). Often it is very common, but during the winter of 1889–90 I saw only three. My latest dates are March 22, 1888, and March 30, 1890.

Sialia mexicana occidentalis. Western Bluebird.

This bluebird is a common resident. Its nests may be found from the middle of April until June. In winter it associates with Lawrence's warbler and the pine, green-backed and willow goldfinches.

Sialia arctica. Mountain Bluebird.

The mountain bluebird sometimes occurs as a rare winter visitant.

SOME PASSAMAQUODDY WITCHCRAFT TALES.

BY J. DYNELEY PRINCE, PH.D.

(*Read November 17, 1899.*)

The following six tales of witchcraft were related to me during the summer of 1899 at Bar Harbour, Me., by Mr. Newell S. Francis, of the Passamaquoddy[1] tribe, now resident with his people, numbering some 500 to 600 souls in all, on their reservation at Pleasant Point, Me. (Pass. *Sĭbắyĭk*). The chief interest of these stories lies in the facts, first, that they are the utterances of a comparatively intelligent Indian who firmly believes in the genuineness of the phenomena which he describes, and, secondly, that they were recorded by means of a phonograph, into which Mr. Francis spoke with great distinctness, thus enabling me to reproduce them with much greater phonetic exactness than if he had written them in the very imperfect system at present followed by the few Indians of this tribe who can write their language.

Any missionary to the Passamaquoddies, or to their kindred, the New Brunswick Maliseets, the Penobscots of Oldtown, Me., or the Micmacs and Abenakis of Quebec, will admit that belief in the ancient Shamanistic sorcery among these Indians has by no means died out. Among the Passamaquoddies and Maliseets[2] particularly there is still a perfect mine of material relating to the wizards and their power over other men and over the curious beings with which the Indians have peopled the mysterious forests of their country. It is to be regretted that more interest is not taken in this highly curious people, who in the course of fifty years are almost bound to disappear, but whose old men and women are still able to impart much that is very valuable both to the philologist and to the student of native American beliefs.[3]

---

[1] The word Passamaquoddy is a corruption of the Indian *Pĕstŭmwōkā́dyĭk*, the plural of the participial formation *Pĕstŭmwōk-ăd* "he who catches the pollock-fish" from *Pĕskŭtŭm-wōk* "pollock-fish," + *-ād*, participial ending. Cf. Pōnnămwōk-ăd "he who catches frost-fish."

[2] The Maliseets, sometimes called St. John Indians, live in New Brunswick, on the river St. John. They are identical with the Maine Passamaquoddies in race and language. They are called in the native idiom: *Wŭlăstŭk-wĭyĭk* "Indians of the river St. John (*Wŭlāstŭk*)."

[3] See Prince, *Proc. Amer. Philos. Soc.*, xxxvi, pp. 479–495; *Annals N.Y. Acad. Sci.*, xi, pp. 369–377.

In pre-Christian times the Passamaquoddies, like their other Algic kindred, were Shamanists, worshipers of the demons of the wilderness and the lakes, and firm believers in the almost unlimited power of their *m'dĕaulĭnwŭk* or wizards, many of whom still exist, subordinately, of course, to the Catholic doctrine, which nearly all the Indians profess. Francis informs me that there are only three or four Protestant Passamaquoddy families

A few specimens of these sorcerers' power are described below in the curiously curt style of Algic narrative. We see from the following tales that the wizards could transform themselves into animals at will (see tale i); that they could cast a spell or curse on an enemy, even though he might also be *m'dĕaulĭn* (tale ii); that they could violate the laws of nature so far as to walk in hard ground, sinking up to the ankles or knees at every step (tale iii), and, finally, that they could communicate with each other telepathically (tale iv). I need hardly comment on the first two and the fourth of these wonders, as they are common among all Shamanistic conjurers, but the third phenomenon, *e. g.*, the power to sink into hard ground while walking, is, I believe, characteristically American. Rink states that this is not an unusual feat among the conjurers of the Greenland Eskimo, who frequently sink into rocky and frozen ground "as if in snow." The trick is probably done by some peculiar way of stooping. Leland compares here, however, the Old Norse statements regarding their wizards, who occasionally sank into the ground and who had power to pass through earth with the same ease as through air or water (*Algonquin Legends*, p. 342). It would be hardly permissible to draw a parallel between the ancient Norsemen and the northern Indians on this account, as the case he cites is that of a conjurer who disappeared into the ground *head downwards*, when he was stabbed at by a foe. It should be noticed that in the following tale, my authority did not *see* the actual feat, but only the deep tracks of the wizard where he had sunk into the earth "the night before," as Francis expressed it in his explanation.

The fifth anecdote, of a cannibalistic feast, is highly interesting. The wizards here eat their murdered comrade, evidently with the idea of absorbing into themselves some or all of his power. The cannibalistic orgies of the South Sea Islanders should be compared with this practice. For example, the Fijis and the Maoris of New Zealand ate their enemies with the same object in view, *e. g.*, to become as brave as the fallen foe had been. All authorities tend to show, however, that cannibalism was extremely rare among the American races, and was only resorted to in isolated cases like the one here noted.

The sixth tale, of the *kīwắ'kw*, or snow-demon, is one of a great number. The Algic Indian believed in many spirits, some benevolent like the *w'năg'mĕ́swŭk* or little people, who were wont to warn the tribesmen of impending danger,[4] some harmless like the wandering *kīwā́·kw* or the *chĭb'lā́kwē*, the tree sprite, who sits in the crotch of the large branches, and some distinctly malevolent like the *ăppṓd'mk'n̥* or spirit of the deep water who lurks in the lakes to drag down the unwary swimmer.

In the notation of the tales I have used the following system. The consonants are to be pronounced as in English, with the exception of *ṭ* and *ḳ*, which represent voiceless *tenues*; *n̈*, which is the French nasal *n*; *w'*, the whistled initial peculiar to the Pass., Abn. and Lenape, and ', which is a guttural voice-stop, not unlike the Semitic *ayin*. When *n* and *m* are written in juxtaposition to a following consonant they have their simple nasal tone-value. The vowels, whose exact quantity I have marked in the Passamaquoddy and Penobscot, have the Italian values, except in the case of the apostrophe, ', which is a very short *ŭ*, and *ŭ̈*, which is equivalent to *oo* in "good."

The intonation of the Passamaquoddy dialect is difficult to acquire. In the narrative style, the syllables are spoken in what is nearly a monotone, until the tone syllable is reached, when the voice runs up a musical third and drops the same interval on the syllable after the accent. When a word has two accents, one following the other, as, for example, in *pṓhḗgŭnŭl*, the first accented syllable is unusually prolonged in a sing-song tone and the second is marked by the voice-rise. These peculiarities are perfectly reproduced by the phonograph.

I have made the grammatical analysis following the tales, partly by means of a direct study of the Pass. itself and partly by means of a colloquial knowledge of the kindred Abenaki language of Canada, which is almost identical with the Penobscot idiom of Oldtown, Me., and is very close to the Lenape.

---

[4] Cf. Prince, *Annals N.Y. Acad. Sci.*, xi, p. 373.

I.

K'chī[1] Joe Bĕnōít m'dēaulĭn[2] pōhḗgŭnŭl[3] k'chī k'nạ́kwchĭl.[4] Ūmā́ṭn-ṇṭēnīyāl[5] k'd'gĭl skīṭā́pyĭl.[6] Pṓhḗgŭnŭl k'chī āt-hōzíswŭ̊l.[7] M'dēaul-ĭnwŭ̊k nḗ'sēyĭk[8] t'līp'n'ltṓwụk. Kīzīp'n'ltītĭt[9] m'sīdē nsēyō kŭ̊spĕn.[10] Nọ́dắmĕn[11] Joe Bĕ́nōĭt kĭstā́hāl[12] k'd'gĭl skīṭā́pyĭl. Kīzīp'n'ltī́tĭt k'dŭ̊k skīṭāp mḗ'chīnē.[13]

II.

K'chī Lācōt(e) m'dḗaulĭn k'chī Sābātĭssịz'l[14] ūmā́ṭnṭēnīyāl. K'chī Lācōt(e), ūnājĭ'tŏn mskwĭglāhḗgŏn k'chī'kŏk.[15] Kīzī'tāq pīzḗssīn. w'tŭ̊gwĕjĭ'tŏn wāgōnā́'kwĕm. W'mā́jĕtauk kḗgĕskw. Wāgōnā́'kwẹm kwĭllhṓgăn.[16] Ūkwūṣsīz'l ūkigw'họgŏl (ūsẹb'mōyṓgŏl). W'gīchījī-tŏn[17] Lācōte Sābātĭssīz'l ūm'dēaulĭnwĭk-p'nĭlkŏl.

III.

Nīl nānā́nkō kĕsĭg'd'nīyăn n'mī́hā skīṭāp m'dḗaulĭn'wḗū lī́wīzō[18] Mĭ'kŭ̊mwĕss. Nṭīṓgŭn[20] ngīzīḳwĕtḳḗūs[21] nāgā ngīzīkīnōslŭ̊ggŏn[22] ēd'lī kīzīḳwĕtḳēū́sĕt. Nīl n'mī́tŏn[23] ĕlā́ptāk[24] wĕjṓsĕt.[25]

IV.

N'mī́taukws[26] nṓdwā ēd'lĭntauk nībā́īyū ōt'lĭntŭwḗwāl wīdā́pyĭl. Ūnṓdā́gŏl ēd'lĭntauk-mĕdĕ́ntākw pīchĕdṓg ngwŭ̊ttā t'kĕssōsā́lkwŭ̊t t'līgĕdŏ́ñkē.

V.

Nzī́wĕs nt'lāg'nṓd'māk pīchē kĭskākĕsĭ́gd'n māṭndŏ́ltītĭt m'dēaulĭ́nwŭ̊k. Pḗsk'wŏl[27] ụnĕp'hā́nịā. Ūmājĕp'hā́nịā Mnā'nŏk ḗd'lī-spāsēgĕk. Nĭt ēd'līpŏltītĭt.

VI.

Nĭ́zwŭ̊k skīṭā́pyĭk t'līg'dŏ́ñḳīyĭk ḳŭ̊spḗmŭ̊k. Slākīū ūnōd'wā́nịā wḗnīl[29] măskwŭ̊lămīyĭlījĭl ĕlmāg'mĕk mḗ'tāg'mĕk. Nōdausā́nịā—āpch ūnōd'wānịā măskwŭ̊lămīyĭlījĭl. Ūnĭmĭyā́wāl wĕchḳōyālījĭl. Mālŭ́m'dē pĕchī'yĭl ēyī'tĭt. Ūtīyānịā: p'lchīnĕss mĭts.[30] Ŏ'tīd'mŭ̊n[31] yōt skīṭāp: ḳā́ṭāmā[32] ngīzījĕnḗs-hīyū tḗtĭnt'lī ēd'lĭt'kḗyĭk[33] lā́'tōgwĕssnŭ̊k. Yōt skīṭāp ĕlwḗ'kāl kīwā́'kw.

I.

Old Joe Benoit, the wizard, changed himself into a big turtle. He had quarreled with another man. The latter changed himself into a great serpent. The wizards fought together at *Né'sḗyĭk.*[8] After the fighting, the lake was all stirred up. I heard that Joe Benoit beat the other man. After the fight the other man died.

II.

Old Lacote, the wizard, quarreled with old Sabatis.[14] Old Lacote had made a dead-fall trap for bear in the woods. After he had made it, he crawled in (to test it). He pulled the prop-stick, touching it only a little. The prop-stick fell on him. His son (however) rescued him. Lacote knew that Sabatis had bewitched him.

III.

When I was fifteen years old, I saw a man who was a wizard He was called a *Mí'kŭmwĕss*[9] (a wood-devil). He told me that he had sunk into hard ground up to his ankles, and he showed me the place where he had done so. I saw the tracks where he had walked.

IV.

I heard my father (once) singing by night to his partner and he (the partner) heard him (my father) singing when he (the partner) was hunting a hundred miles away.

V.

My brother told me that many years ago certain wizards had a quarrel. They killed one (of their number). They brought him to Grand Manan,[18] where there was a steep ledge and there they ate him.

VI.

Two men were hunting on a lake. Suddenly they heard some one whooping along the lake, at the foot of the lake. They went out, and again they heard him whooping. They saw him coming. Right up he comes to where they are. They said to him: "Won't you eat?". That man said: "I cannot stop; I must go to where it is cold, to the north." That man must have been a *Kīwá'kw.*[14]

Grammatical Analysis.

[1] *K'chī* means properly "big," but in Pass. and Abn. it is frequently used for "old;" cf. Abn. *ădālī k'chīăwĭt* "he who is oldest" (participle). Oj. *kitchi*, Cree *ki'chi* mean "big." In Oj., however, the prefix *kete-*, clearly allied to *k'chī*, means "old." Both the Del. *chinge* "big" and *kikey* "old" (modern *kikes* "adults, parents") undoubtedly belong here. I doubt, however, whether we should compare with this root, as Brinton does (*Lenâpé*, pp. 102–4), the large class of derivatives in Del. beginning with *gisch-*, used to denote successful action, as in *gischigin* "to begin life, to be born;" *gischiton* "he makes it ready;" Abn. *kīzĭtō*, etc. The Cree *kije-* "perfect" (Lacombe, *Dict. de la Langue des Cris*, s. v.) may be cognate here.

[2] *M'déaulĭn* "wizard" appears in old Del. as *meleu* "one who drums," *e. g.*, a witch-doctor, referring to the practice of the medicine men of beating drums to drive away evil spirits. Thus, Del. *meleohet* is a drum or any hollow body. In mod. Del., *meleu* denotes a turkey-cock, which drums with its wings (so Anthony in Brinton, *Lenâpé Dict.*, p. 83). Cf. Oj. *mĕdéwin* "sorcery" and *ţĕwē-igē* "he beats a drum" (*ţĕwé-īgŭn* "drum").

[3] In *pōhégŭnŭl* and the following word, we have the ending *-ŭl* of the obviative, or accus. of the third person, which appears in all the Algic idioms.

[4] *K'nạkwchĭl* "turtle" (note the obv. *-ĭl* as object of pōhégŭnŭl) is an exact cognate of abn. *Mĭkĕnākw* "turtle." Compare Micmac *mĭkchĭkch*, Oj. *mĭshĭkē* "turtle."

[5] *Ŭmáţnţēnīyāl*, also in the obv., is clearly cognate with Del. *machlenaḷittin*, *machlayen* "to quarrel."

[6] In *skīţāp* "man" (*-yŭl*, obv. ending), sometimes *ŭ́skīţāp*, we evidently have the ending *-āpē*, which is used in Del. as the regular terminal to denote the human male. Thus, *lĕn-āpē* "a Del. Indian" (*lĕnno* "man" + *āpē*). With *lĕnno*, cf. Cr. *ĭlĭnĭ*, Oj. *ĭnĭnĭ*. O. Abn. *ărēn-ăñbē*, Mod. Abn. *ăln-ōmbā*, O. Narragansett *nin*, Naugatuck *rinh*, etc. Del. *kĭk-āpē*, "a bachelor," is formed in the same way. Brinton (*Len.*, p. 100) derives *-āpē* from a root *ap* "to cover sexually," which he states appears in Oj., used only of the lower animals. I cannot find it so applied. This *-āpē*, however, is found in O. Abn. *ărēn-ăñbē*, Modern Abn. *ăln-ōmbā* (Penobscot *ăḷn-āmbā*) "indian," and in old Mass. *wusketomp* "man," exactly equivalent to

Pass. *ū́skīṭāp*. Cf. in this connection Pass. *n-īd-āp* Mod. Abn. *n-īd-ŏmbā* "my friend" (male). I find *nīdōmbāskwā* "*mon amie*" in Abn. for the feminine. This *-āp* clearly appears also in Pass. *hīy-āp* "buck" (male deer) and Mod. Abn. *nōmba-lhā* "cock." I am inclined to connect the first syllable of *ū́skīṭāp* "man" (Mass. *wuskelomp*) with the Abn. root *ūskī* "young," regarding the *ṭ* as a mere connecting consonant.

[7] *Ālthŏzišwŭl* is a combination of *āl-hō* + *zǐs* (*sǐs*), diminutive ending, + *-wŭl*, obv. termination. This may be connected with Del. *achgook* "snake," with which should be compared Abn. *s-kŏg*.

[8] *Nḗ'sḗyǐk* means "the muddy lake." The ending *-ǐk* is locative.

[9] *Kīzīp'nǐllǐtǐl*. *Kīzī-*, sign of the past (also "can") from the verb *kīzītŏ* "he makes," + *p'nǐl*, with which cf. Del. *linalillin* "fright," + the participial ending of the 3 p. pl. *-tǐtǐl*.

[10] *Ḳū́spēn*, cf. *ḳūspḗmūk* in vi, probably from *ḳūs-* "big" also "fast," and *-pē*, the termination denoting water seen in Abn. *sībō-bī* "river water." The Abn. word for water is *n'bī*, cf. Del. *mbi*, Oj. *n'bi*, etc. This appears in Pass. only in compounds such as *wǐkhīg'n-nūp* "book-water," *e.g.*, "ink." The regular Pass. expression is identical with the Micmac, *i. e.*, *sā́mā́gwān*. The element *ḳūs-* appears in Abn. *k'kūstōn̄gzǐn* "you talk big, *e. g.*, haughtily." Cf. also *Kūz-ibịā* "paddle quickly."

[11] *Nṓdā́mēn*, from *n'*, prefix of 1 p. sing., + √*nod*, + *amen* sign of the inanimate. Cf. Abn. *nŏdămēn* "I hear" and Oj. *nūndāgē* "he hears" (is not deaf).

[12] *Kǐstāhāl* "he conquers him," perhaps cognate with Abn. *k'kǐs-tṓnā-nā* "we decide, settle."

[13] *Mḗ'chīnē*, cf. Abn. *māchīnā* "he is dead."

[14] *Sābātǐssīz'l* is the name *Sābātǐs*, the Indian corruption of Jean Baptiste, + the dim. ending *-sǐs*, + the obv. termination *'l,ul*.

[15] *K'chī'kŏk* "in the woods," with the loc. *-ŏk*, is, perhaps, cognate with the Del. *teke-ne-k* "in the woods." If so, we must suppose a metathesis *te-ke* = *k' -chī*, in which the *te* corresponds with the probably palatalized *-chi*.

[16] *Kwǐllhṓgăn* is probably cognate with the Del. *quillutamen* "he falls upon it, attacks it."

[17] *W'gīchījītŏn* "he knows," with inan. ending *-tŏn*, is perhaps cognate with Del. *kigin-amen* "he knows it," the Del. *-gi-* being represented by the palatalized *-chī-*, as in note 15.

[18] *Līwīzō*; √*līwī* + *zō*, reflexive ending of 3 p. sg. Cf. Abn.

ndéliwizi "I am called; *kd-ēliwi-t-ămĕn* "you call it," etc. The same root appears in Del. *wdellowunsowagan* "name." The Abn., however, drops the element *li* in the substantive *wizōwōñgăn* "name."

[19] The *Mi'kŭmwĕss* is a wood-spirit which may become the familiar of a wizard; the Passamaquoddies say, of a certain *m'dēaulin*: *mi'kŭmwĕss-ū'kē* "he is partner with a *mi'kŭmwĕss*. The wizard in this story was evidently in possession of such a familiar.

[20] *Ntiōgŭn* consists of the prefix of the 1 p. sing. *n-*, the connecting consonant *-t-*, the root *ī* and the suffix *-gŭn* "he." For this root, cf. *n-t-ī-dăm* "I say;" Abn. *nd-īl-gōn* "he says to me." The prefix *n-* and suffix *-gŭn* with the root infixed always mean "he .... to me;" cf. Abn. *ngīz-ădgăkĭm-gōn* "he taught me," and see below note 22.

[21] *Ngīzīkwdlkēūs* is direct oration "I sank into the ground." *Kīzī* (see above note 9) becomes *gīzī* here by partial assimilation to the preceding nasal.

[22] *Ngīzīkinōsldggōn* cf. the remarks above, note 20, on *ntiōgŭn*.

[23] *N'mitōn* "I see it" (inan.). The animate form is *n'mikā*, as above *n'mikā skitāp* "I see (him) a man."

[24] *Elāpnăk*, cf. Abn. *ălōmtōk* "tracks which he made" (partc.).

[25] *Uĕjān*, partc. 3 p. "which he made."

[26] To illustrate the similarity between the Penobscot and Passamaquoddy, I give here the Penobscot version of this and the following anecdote. In the Pen. dialect every syllable receives equal voice-stress.

IV.

[illegible]

V.

[illegible]

[illegible] must of course be obviative as the object of the verb [illegible] in the 3 p.

[illegible] Abn. [illegible] Pass. [illegible] means 'island.'

[illegible] who someone' cf. Abn. [illegible] Del. [illegible]

Pass. [illegible] Abn. and [illegible] 'I eat.'

[31] This is a combination of *ɣ*, 3 p. prefix, the connecting consonant *t*, the root *ī* (see above note 20), and *-ămĕn*, the inanimate ending.

[32] *Ḳāṭāmā* "not." *Ḳāṭ* or *skāṭ* is the neg. element, cf. the Del. *taku*, an excellent example of metathesis.

[33] *Ēd'lī-t'kḗyĭk*. *Ēd'lī* is the relative particle "which, where;" *t'kē* appears in Abn. *t'kā*, Del. *tehek* (sbst.) "cold."

[34] The *kīwā́'kw* is essentially a cold demon, rejoicing in snow and ice. An old Indian told me that his father had seen one running on the snow-crust without snow shoes as swiftly as a deer.

Stated Meeting, December 1, 1899.

Vice-President SELLERS in the Chair.

Present, 23 members.

The resignation of Hon. Wayne McVeagh was read and on motion accepted.

Donations to the Library were announced and thanks were ordered therefor.

Prof. Lewis M. Haupt read a paper entitled "Failure of Dams and Reservoirs."

The annual reports of the Treasurer, the Curators and the Standing Committees were presented.

The Trustees of the Building Fund made a report, which was ordered to be spread upon the Minutes and referred to the Finance Committee.

The Society was then adjourned by the presiding officer.

Stated Meeting, December 15, 1899.

Vice-President **Sellers** in the Chair.

Present, 30 members.

The Curators announced that the portrait of Dr. Rush had been restored and placed in the North room of the Society.

The death of Sir Rawson W. Rawson, of London, England, a member of the Society, was announced.

Prof. Haupt made the following remarks supplementary to his paper read October 6, "On the Results Secured at Aransas Pass, Tex., by the Reaction Breakwater:" (See page 135.)

As stated in the paper presented on October 6, the bids for the removal of the obstructing Government jetty were advertised on September 25 for thirty days. When they were opened it was found that there was but one bidder, that his bid was informal and in consequence the work was not undertaken.

On December 7, the Washington dispatches reported that Hon. Rudolph Klebery, representing the Aransas Pass district, introduced a bill into Congress to place the work under the continuing contract system, with authority to complete the double jetty plan as proposed by the U. S. Engineers which were estimated to cost $1,500,000, to create a channel by dredging and thus destroy the utility of a work which has already produced a navigable channel of fifteen feet M.L.W. at a cost of about one-twentieth the usual Government method, in much less time and without dredging. The channel is maintained by the currents, and is therefore relatively permanent.

A year will therefore soon have passed under a renewal of Government jurisdiction, with nothing further done toward the completion of the reaction breakwater.

The report of the Finance Committee was received.

The appropriations for the year 1900 were made.

The Society then held an election for members of the

Society, and the Tellers reported that the following gentlemen had been duly elected:

Coleman Sellers, Jr., Philadelphia.
Edwin Swift Balch, Philadelphia.
James Dewar, London, Eng.
Thomas C. Mendenhall, Worcester, Mass.
Daniel Baugh, Philadelphia.
Lindley M. Keasbey, Bryn Mawr.
L. W. Miller, Philadelphia.
Sir William Henry Preece, London, Eng.
Jacques Loeb, Chicago.
Charles Otis Whitman, Chicago.
Thomas Hunt Morgan, Bryn Mawr.
Henry Kraemer, Philadelphia.
Thomas Harvey Daugherty, Philadelphia.
Capt. Charles D. Sigsbee, U. S. N., Washington, D. C.
Barton C. Hirst, Philadelphia.
W. C. Broegger, Christiania, Norway.
Alexander Jay Wurts, Pittsburg, Pa.
Otis T. Mason, Washington, D. C.
Frederick W. True, Washington, D. C.
William H. Holmes, Washington, D. C.
A. B. Meyer, Dresden, Saxony.
Robert C. H. Brock, Philadelphia.
Gustave Schlegel, Leiden, Holland.
Albert Matthews, Boston, Mass.
J. Rodman Paul, Philadelphia.
Hugo A. Rennert, Philadelphia.
Edward Coles, Philadelphia.
J. Dundas Lippincott, Philadelphia.

Officers and Councillors for the ensuing year were nominated.

The Society was then adjourned by the presiding officer.

INDEX TO VOLUME XXXVIII.

Page.
Acetylene Diodide, Liquid 22
Appropriations for 1900 190
Aransas Pass, Tex., Results Secured at, by the Reaction Breakwater 135
Australian Tribes, Divisions of North 75
Baird, Obituary of Col. Alexander Biddle 154
Barker, George F., Delegate to Stokes Jubilee 155
Baur and Case, History of the Pelycosauria, with Description of Genus Dimetrodon. 23
Birds of Santa Clara County, Cal., Notes on 157
Book of the Dead 79
Breakwater, Reaction, Results of, Secured at Aransas Pass, Tex 135, 190
Brinton Memorial Meeting 155, 156
Buti, On an Interesting Fragment of the Book of the Dead 79
Butterflies, Genealogical Trees of 147
Calendar of the Correspondence of Brigadier-General George Weedon, U. S. A., with
    Celebrated Characters of the American Revolution 81
  of Richard Henry Lee and Arthur Lee 114
Carthagenian Tombstone 71
Catalogue of portraits and busts 154
  of Scientific Literature, Committee on 23
Chabas, Invitation to Unveiling of Statue to 183
Chairman's Annual Discourse for 1899 49
Committee, Special, on Baur and Case's Paper 23, 24
  On Brinton Memorial 155, 156
  On Buti's Paper 132
  On Catalogue of Scientific Literature 23
  On Seeliger's Paper 7, 24
Committees, Standing 21
Congress for Study of Popular Traditions, Invitation to 134
Connecticut Academy of Arts and Sciences, Invitation to 100th Anniversary 133
Conversazione Proposed 22
Curators' Catalogue of Portraits and Busts 154
Dams and Reservoirs, Failure of 189
Dead, Book of the 79
Dimetrodon, Description of the Genus 23
Divisions of North Australian Tribes, R. H. Mathews 75
Dixon, Samuel G., Elected Councillor 75
Electricity, Transmission of Energy by 49
Energy, Transmission of, by Electricity 49
Failure of Dams and Reservoirs 189
Frazer, Obituary of E. D. Cope 22
Gold in the Glacial Drift of the Adirondacks 134
Goodwin, Presented an Engraving of John Vaughan 75
Grote, On Genealogical Trees of Butterflies 147
  On Specializations of the Lepidopterous Wing; the Parnassi-Papilionidæ . . . 7, 25
Haupt, On the Results Secured at Aransas Pass, Tex., by the Reaction Breakwater . 135
  Failure of Dams and Reservoirs 189

Page.

- Hays, Note on William Penn's Commission for the Government of Pennsylvania during his First Visit to England in 1684 . . . 4
  - Elected Librarian . . . 7
- History of the Pelycosauria, with a Description of the Genus Dimetrodon . . . 23
- Imperial Academy of Sciences of St. Petersburg, Invitation to the 50th Anniversary of Establishment of Central Physical Observatory . . . 24
- Keiser, Liquid Acetylene Diodide . . . 22
- Lee Correspondence, Calendar of . . . 114
- Lepidopterous Wing, Specializations of . . . 7, 25
- Librarian Elected . . . 7
- Liquid Acetylene Diodide . . . 22
- Mathews, Divisions of North Australian Tribes . . . 75
- Meetings, Stated . . . 3, 7, 21, 22, 23, 24, 71, 74, 131, 133, 154, 155, 156, 189, 190
- Members Deceased:
  - Barcena, Don Mariano . . . 154
  - Biddle, Alexander . . . 74
  - Bonwill, W. G. A . . . 134
  - Brinton, Daniel Garrison . . . 134
  - Britton, J. Blodgett . . . 22
  - Bunsen, Robert Wilhelm Eberhard . . . 134
  - Daly, Charles P . . . 134
  - Flower, Sir William Henry . . . 134
  - Franks, Sir Augustus Wollaston . . . 156
  - Goodfellow, Edward . . . 132
  - Hoffman, Walter J . . . 156
  - Hotchkiss, Jedediah . . . 7
  - Kendall, Ezra Otis . . . 3
  - Kiepert, Heinrich . . . 155
  - Marsh, Othniel C . . . 25
  - Orton, Edward . . . 154
  - Rawlinson, George . . . 155
  - Rawson, Sir Rawson W . . . 190
  - Tatham, William P . . . 134
  - Thomson, Frank . . . 134
  - Tilghman, Richard A . . . 25
  - Williams, Sir Monier-Monier . . . 71
- Members Elected:
  - Balch, Edwin Swift . . . 191
  - Baugh, Daniel . . . 191
  - Brock, Robert C. H . . . 191
  - Broegger, W. C . . . 191
  - Cadwalader, John . . . 132
  - Coles, Edward . . . 191
  - Dana, Charles E . . . 132
  - Daugherty, Thomas Harvey . . . 191
  - Davenport, Russell W . . . 155
  - Davis, William Morris . . . 154
  - Day, Frank Miles . . . 155
  - Day, William C . . . 132
  - Dewar, James . . . 191
  - Greenman, Milton J . . . 132
  - Hirst, Barton C . . . 191
  - Holmes, William H . . . 191
  - Keasbey, Lindley M . . . 191
  - Keeler, James E . . . 132
  - Kraemer, Henry . . . 191
  - Lamberton, William A . . . 132

Members elected: *Page.*
- Learned, Marion D 132
- Lippincott, J. Dundas 191
- Loeb, Jacques 191
- MacKenzie, Arthur S 132
- Mason, Otis T 191
- Matthews, Albert 191
- Meigs, Arthur V. 132
- Mendenhall, Thomas C 191
- Meyer, A. B. 191
- Miller, Leslie W. 191
- Morgan, Thomas Hunt 191
- Morris, Harrison S. 132
- Morris, Israel W. 132
- Paul, J. Rodman 191
- Phillips, Francis C. 132
- Poincaré, Henri 132
- Preece, Sir William Henry 191
- Pritchett, Henry S 132
- Ramsay, William 132
- Rawle, William Brooke 132
- Remington, Joseph P 132
- Rennert, Hugo A 191
- Schlegel, Gustave 191
- Sellers, Coleman, Jr. 191
- Shapleigh, Waldron 132
- Sigsbee, Capt. Charles D., U. S. N 191
- Trevelyan, Sir George O. 132
- True, Frederick W. 191
- Vauclain, Samuel M 132
- Whitman, Charles Otis 191
- Wood, Stuart 132
- Wurts, Alexander Jay 191

Membership, Resignation of:
- Hon. Wayne McVeagh 189

Meneghini, Guiseppe, Invitation to Unveiling of Monument to 133
Mnemonics, New System of 7
Morris, On Carthagenian Tombstone 73
North Australian Tribes, Divisions of 75
Notes on Some Birds of Santa Clara County, California 157

Obituaries ordered:
- Brinton, Daniel G. 155

Obituaries read:
- Biddle, Alexander 154
- Bonwill, W. G. A 156
- Cope, E. D. 22
- Tilghman, Richard A. 74

Parnassi, Papilionidæ 7, 25
Passamaquoddy Witchcraft Tales 181
Peirce, Obituary of Dr. W. G. A. Bonwill 156
Pelycosauria, History of 23
Penn's Commission for the Government of Pennsylvania during his First Visit to England in 1684, A note on 4
Prime, Gold in the Glacial Drift of the Adirondacks 134
Prince, Some Passamaquoddy Witchcraft Tales 181
Rush, Dr., Portrait of 190
Sellers, Transmission of Energy by Electricity 49

Page.

Smyth, Albert H., Appointed to Prepare Obituary Notice of Dr. Daniel G. Brinton . . 155
Stellwagen, On Tombstone brought from Carthage 71
Stokes Jubilee, George F. Barker Delegate to 155
Tilghman, Obituary Notice of 74
Translations of Papers published in another language not eligible for the Transactions or Proceedings 155
Van Denburgh, Notes on Some Birds of Santa Clara County, California 157
Vaughan, John, presentation of engraving of 75
Wadamori, On a New System of Mnemonics 7
Weedon Correspondence, Calendar of 81
Wistar, Obituary of Richard A. Tilghman 74

LIST OF MEMBERS

OF THE

American Philosophical Society

HELD AT PHILADELPHIA

FOR PROMOTING USEFUL KNOWLEDGE

(FOUNDED 1743)

January, 1900.

LIST OF MEMBERS

OF THE

AMERICAN PHILOSOPHICAL SOCIETY.

JANUARY, 1900.

A

Name.	*Date of Election.*	*Present Address.*
1687. ABBE, CLEVELAND, Prof.	July 27, 1871,	U. S. Weather Bureau, Washington, D. C.
2170. ABBOT, CHARLES CONRAD, M.D.	Dec. 20, 1889,	Trenton, N. J.
1463. ABBOT, HENRY L., Gen. U. S. A.	April 18, 1862,	23 Berkeley St., Cambridge, Mass.
2311. ABBOTT, ALEXANDER C., M.D.	Feb'y 19, 1897,	Laboratory of Hygiene, University of Pennsylvania, Philadelphia.
1809. ÅCKERMAN, RICHARD, Prof.	July 21, 1876,	Stockholm, Sweden.
1713. ACLAND, SIR HENRY, Bart.	Jan'y 17, 1873,	Oxford, England.
2128. ADAM, LUCIEN	Dec. 17, 1886.	41 Bard Sevigné, Rennes, France.
2081. ADAMS, HERBERT B., Prof.	May 21, 1886,	Baltimore, Md.
1779. AGASSIZ, ALEXANDER, Prof.	April 16, 1875,	Cambridge, Mass.
1642. AGASSIZ, MRS. ELIZABETH	Oct. 15, 1869,	Quincy St., Cambridge, Mass.
1860. ALISON, ROBERT HENRY, M.D.	May 3, 1878,	Ardmore, Montgomery Co., Pa.
2380. ALLEN, ALFRED H.	May 20, 1898,	67 Surrey St., Sheffield, Eng.
1869. ALLEN, JOEL ASAPH, Prof.	Sept. 20, 1878,	Am. Museum of Natural History, New York.
1927. AMES, REV. CHARLES G.	Jan'y 21, 1881,	12 Chestnut St., Boston, Mass.
2064. ANDERSON, GEORGE B., Lt. U.S.A.	Feb'y 19, 1886,	West Point, N. Y.
2164. ANGELL, JAMES B., Pres't.	Oct. 18, 1889,	Ann Arbor, Mich.
2224. APPLETON, WILLIAM HYDE, Prof.	May 19, 1893,	Swarthmore, Pa.
2102. ARGYLL, THE DUKE OF	May 21, 1886,	London, England.
1761. ARMSTRONG, THE RT. HON. LORD	July 17, 1874,	Cragside, Rothbury, England.
1996. ASHHURST, JOHN, JR., M.D.	Jan'y 18, 1884,	2000 Delancey Pl., Phila.
2012. ASHHURST, RICHARD L.	April 18, 1884,	2204 Walnut St., Philadelphia.
2019. AVEBURY, LORD (SIR JOHN LUBBOCK)	July 18, 1884,	High Elms, Down, Kent, Eng.

B

Name.	*Date of Election.*	*Present Address.*
1995. BACHE, R. MEADE	Jan'y 18, 1884,	4400 Sansom St., Philadelphia.
1832. BACHE, THOMAS HEWSON, M.D	Feb'y 2, 1877,	233 S. 13th St., Philadelphia.
2394. BAER, GEORGE F.	Dec. 16, 1898,	Reading, Pa.
2285. BAILEY, L. H., Prof.	May 15, 1896,	Cornell University, Ithaca, N.Y.
1630. BAIRD, HENRY CAREY	Jan'y 15, 1869,	810 Walnut St., Philadelphia.
1991. BAIRD, HENRY M., Prof.	Jan'y 18, 1884,	219 Palisade Ave., Yonkers, N.Y.
2419. BALCH, EDWIN SWIFT	Dec. 15, 1899,	1412 Spruce St., Philadelphia.
2345. BALDWIN, JAMES MARK, Prof.	Oct. 15, 1897,	Princeton, N. J.
2191. BALL, SIR ROBERT STAWELL	May 15, 1891,	Observatory, Cambridge, Eng.
1965. deBAR, HON. EDOUARD SÊVE	July 21, 1882.	Ramsgate, England.
1741. BARKER, GEORGE F., Prof.	April 18, 1873,	3909 Locust St., Philadelphia.
2011. BARKER, WHARTON	April 18, 1884,	119 S. 4th St., Philadelphia.
1902. BARTHOLOW, ROBERTS, M.D.	April 16, 1880,	1525 Locust St., Philadelphia.
2119. BASTIAN, ADOLPH, Prof.	Dec. 17, 1886,	Königgrätzerstrasse 120, Berlin, Germany.
2421. BAUGH, DANIEL	Dec. 15, 1899,	1601 Locust St., Philadelphia.
1934. BEAULIEU, M. PAUL LEROY, Prof.	April 15, 1881,	27 Ave. duBois de Boulogne, Paris, France.
1968. BELL, ALEXANDER GRAHAM, Prof.	July 21, 1882,	1331 Connecticut Ave., Washington, D. C.
1802. BELL, SIR LOWTHIAN, Bart.	April 21, 1876,	Northallerton, England.
2255. BEMENT, CLARENCE S.	May 17, 1895,	1804 Spring Garden St., Phila.
2326. deBENNEVILLE, JAMES S	Oct. 15, 1897,	University Club, Philadelphia.
2264. BERTHELOT, M. P. E. MARCELIN	May 17, 1895,	Paris, France
2253. BERTIN, GEORGES	May 17, 1895,	11 bis Rue Ballu, Paris.
1920. BIDDLE, CADWALADER	Oct. 15, 1880,	1420 Walnut St., Philadelphia.
1831. BIDDLE, HON. CRAIG	Feb'y 2, 1877,	2033 Pine Street, Philadelphia.
2134. BILLINGS, JOHN S., M.D.	Feb'y 18, 1887,	40 Lafayette Place, New York.
2256. BISPHAM, GEORGE TUCKER	May 17, 1895,	1805 Delancey Place, Phila.
2157. BLAIR, ANDREW A.	May 17, 1889,	406 Locust Street, Philadelphia.
1554. BLAIR, THOMAS S.	Jan'y 19, 1866,	718 Bidwell St., Pittsburg, Pa.
1669. BLAKE, WM. PHIPPS, Prof.	Oct. 21, 1870,	Tucson, Arizona.
1700. BLODGET, LORIN	April 19, 1872,	1329 S. Broad St., Philadelphia.
1444. BÖHTLINGK, M. OTTO	Jan'y 17, 1862,	Seeburgstrasse 35, II. Leipzig.
2235. BONAPARTE, PRINCE ROLAND	Feb'y 15, 1895,	10 Ave. d'Jena 22, Paris, France.
1126. BOYÈ, MARTIN H., Prof.	Jan'y 17, 1840,	Coopersburg, Lehigh Co., Pa.
1826. BRACKETT, CYRUS FOGG, Prof.	Feb'y 2, 1877,	Princeton, N. J.
2083. BRANNER, JOHN C., Prof.	May 21, 1886,	Stanford Univ., Palo Alto, Cal.
2195. BREZINA, ARISTIDES	May 21, 1886,	VII Siebensterngasse, 46, Vienna, Austria.
2069. BRINTON, JOHN H., M.D	Feb'y 19, 1886,	1423 Spruce St., Philadelphia.
2433. BROCK, ROBERT C. H.	Dec. 15, 1899,	1612 Walnut St., Philadelphia.
2080. BROOKS, WILLIAM KEITH, Prof.	May 21, 1886,	Johns Hopkins Univ., Baltimore, Maryland.
1881. BROWN, ARTHUR ERWIN	April 18, 1879,	1208 Locust St., Philadelphia.
2393. BROWN, ERNEST WILLIAM, Prof.	Dec. 16, 1898,	Haverford College, Pa.
2275. BRUBAKER, ALBERT P., M.D.	Oct. 18, 1895,	105 N. 34th St., Philadelphia.
1547. BRUSH, GEORGE J., Prof.	Jan'y 20, 1865,	Yale Univ., New Haven, Conn.
2376. BRYANT, HENRY GRIER	May 20, 1898,	Room 805 Land Title Building, Philadelphia.
2237. BRYCE, RIGHT HON. JAMES	Feb'y 15, 1895,	54 Portland Place, London W., England.
2236. BUDGE, E. A. WALLIS	Feb'y 15, 1895,	British Museum, London, Eng.
1653. BULLOCK, CHARLES	Oct. 15, 1869,	1017 Clinton St., Philadelphia.
2007. BURK, REV. JESSE Y	Jan'y 18, 1884,	400 Chestnut St., Philadelphia.
1938. BUTLER, HON. WILLIAM	April 15, 1881,	West Chester, Pa.

C

	Name.	*Date of Election.*	*Present Address.*
1788.	CAMPBELL, JOHN LYLE, Prof. . .	July 16, 1875,	Crawfordsville, Ind.
1606.	CANBY, WILLIAM MARRIOTT . . .	Oct. 16, 1868,	1101 Delaware Avenue, Wilmington, Del.
2051.	CANNIZZARO, TOMMASO	Oct. 16, 1885,	Santa Maria fuori cinta, Casa Roffa, Messina, Sicily.
2416.	CADWALADER, JOHN	May 19, 1899,	1519 Locust St., Philadelphia.
1731.	CAPELLINI, GIOVANNI, Prof. . .	April 18, 1873,	Portovenere près Spezia, Italy.
1796.	CARLL, JOHN F.	Oct. 15, 1875,	Pleasantville, Venango Co., Pa.
1911.	CARSON, HAMPTON L.	April 16, 1880,	1033 Spruce St., Phila.
2260.	CARTER, HON. JAMES C	May 17, 1895,	54 Wall Street, New York City.
1707.	CASSATT, ALEXANDER J	Oct. 18, 1872,	Haverford, Del. Co., Pa.
2147.	CASTNER, SAMUEL, JR.	Dec. 16, 1887,	3729 Chestnut St., Philadelphia.
2152.	CATTELL, J. MCKEEN, Prof. . . .	May 18, 1888,	Garrison-on-Hudson, N. Y.
1908.	CHANCE, HENRY MARTYN, M.D .	April 16, 1880,	4128 Parkside Ave., Phila.
1783.	CHANDLER, C. F., Prof. . .	April 16, 1875,	Columbia Univ., N. Y. City.
1778.	CHAPMAN, HENRY C., M.D. . . .	April 16, 1875,	2047 Walnut St., Philadelphia.
2132.	DE CHARENCEY, COMTE HYACINTH	Dec. 17, 1886,	25 rue Barbet de Jouy, Paris, France.
2158.	CLARK, CLARENCE H.	May 17, 1889,	42d and Locust Sts., Phila.
1717.	CLARKE, THOMAS	Jan'y 17, 1873,	127 Duane St., New York, N.Y.
1983.	CLAYPOLE, E. W., Prof.	Jan'y 19, 1883,	Pasadena, Cal.
2247.	CLEEMANN, RICHARD A., M.D . .	Feb'y 15, 1895,	2135 Spruce St., Philadelphia.
2336.	CLEVELAND, HON. GROVER. . . .	Oct. 15, 1897,	Westland, Princeton, N. J.
1999.	COHEN, J. SOLIS, M.D.	Jan'y 18, 1884,	1341 Walnut St., Philadelphia.
2429.	COLES, EDWARD	Dec. 15, 1899,	1734 Chestnut St., Philadelphia.
2305.	CONKLIN, EDWIN GRANT, Prof. .	Feb'y 19, 1897,	University of Penna., Phila.
2386.	CONVERSE, JOHN H.	May 20, 1898,	500 N. Broad St., Philadelphia.
2257.	COOK, JOEL	May 17, 1895,	819 N. Broad St., Philadelphia.
2129.	CORA, GUIDO, Prof.	Dec. 17, 1886,	Corso Vittorio Emanuele, 74, Turin, Italy.
1662.	COX, HON. JACOB D.	April 15, 1870,	Cincinnati, O.
2207.	CRAMP, CHARLES H	Dec. 16, 1892,	507 S. Broad St., Philadelphia.
1836.	CRANE, THOMAS FREDERICK, Prof.	Feb'y 2, 1877,	Cornell Univ., Ithaca, N. Y.
2100.	CROOKES, SIR WILLIAM	May 21, 1886,	7 Kensington Park Gardens, London, W., England.
2388.	CROWELL, EDWARD P., Prof . . .	Dec. 16, 1898,	21 Amity St., Amherst. Mass.
2172.	CRUZ, HON. FERNANDO, M.D. . .	Dec. 20, 1889,	Washington, D. C.
2317.	CULIN, STEWART	May 21, 1897,	University of Penna., Philadelphia.
1439.	CURWEN, JOHN, M.D.	April 18, 1861,	Warren, Pa.
2296.	CUSHING, FRANK HAMILTON. . .	May 15, 1896,	Bureau of Ethnology, Washington, D. C.

D

	Name.	*Date of Election.*	*Present Address.*
1567.	DA COSTA, J. M., M.D	Oct. 19, 1866,	1700 Walnut St., Philadelphia.
2361.	DALL, WILLIAM H.	Dec. 17, 1897,	U. S. National Museum, Washington, D. C.
2402.	DANA, CHARLES E.	May 19, 1899,	2013 DeLancey Place, Philadelphia.
2282.	DANA, EDW. S., Prof.	May 15, 1896,	Yale Univ., New Haven, Conn
1806.	DANNEFELD, C. JUHLIN	April 21, 1876,	27 Gt. Winchester St., London.
2369.	DARWIN, GEORGE HOWARD, Prof.	Feb'y 18, 1898,	Newham Grange, Cambridge, England.
2425.	DAUGHERTY, THOMAS HARVEY .	Dec. 15, 1899,	School House Lane, Germantown, Philadelphia.

Name	*Date of Election.*	*Present Address.*
1811. Davenport, Sir Samuel	Oct. 20, 1876,	Beaumont, Adelaide, S. Australia.
1557. Davidson, George, Prof.	Jan'y 19, 1866,	2221 Washington St., San Francisco, Cal.
2417. Davis, William Morris	Oct. 20, 1899,	Cambridge, Mass.
1923. Dawkins, William Boyd, Prof.	Oct. 15, 1880,	Woodhurst, Fallowfield, Manchester, England.
2418. Day, Frank Miles	Oct. 20, 1899,	801 Penn Mutual Building, Philadelphia.
2406. Day, William C., Prof.	May 19, 1899.	Swarthmore, Pa.
2360. De Garmo, Charles, Prof.	Dec. 17, 1897,	Cornell Univ., Ithaca, N. Y.
2208. Dercum, Francis X., M.D.	Dec. 16, 1892,	1719 Walnut St., Philadelphia.
2434. Dewar, James, Prof.	Dec. 15, 1899,	The Royal Institution, London, England.
2013. Dickson, Samuel	April 18, 1884,	901 Clinton St., Philadelphia.
2208. Dixon, Samuel G., M.D., Pres't.	Dec. 16, 1892,	1900 Race St., Philadelphia.
2108. Dolley, Charles S., M.D.	Dec. 17, 1886,	3707 Woodland Ave., Phila.
2089. Donner, Otto, Prof.	May 21, 1886,	Helsingfors, Finland.
1946. Doolittle, C. L., Prof.	Oct. 21, 1881,	Upper Darby, Delaware Co., Pa.
1839. Douglas, James	April 20, 1877,	Spuytenduyvil, New York, N.Y.
1924. Draper, Daniel	Oct. 15, 1880,	Meteorological Observatory, Central Park, New York.
2303. Dreer, Ferdinand J.	Feb'y 19, 1897,	1520 Spruce St., Philadelphia.
1787. Drown, Thomas M., Pres't.	July 16, 1875,	Lehigh Univ., S. Bethlehem, Pa.
1918. Du Bois, Patterson	Oct. 15, 1880,	1031 Walnut St., Philadelphia.
1878. Dudley, Charles Benjamin	Jan'y 17, 1879,	Drawer 334, Altoona, Blair Co., Pa.
2063. Duncan, Louis, U. S. N.	Feb'y 19, 1886,	Johns Hopkins University, Baltimore, Md.
1573. Dunning, George F.	Jan'y 18, 1867,	Farmington, Conn.
1727. Dupont, Edouard	April 18, 1873,	Royal Museum, Bruxelles.
2227. DuPont, Henry A.	Feb'y 16, 1894,	Winterthur, Montchanen, Del.
1679. Dutton, Clarence E., Capt. U.S.A.	Jan'y 20, 1871,	U. S. Arsenal, Washington, D.C.

E

2105. Easton, Morton W., Prof.	Dec. 17, 1886,	224 S. 43d St., Philadelphia.
1917. Eckfeldt, Jacob B	Oct. 15, 1880,	U. S. Mint, Philadelphia.
1825. Eddy, H. Turner, Prof	Feb'y 2, 1877,	University of Minnesota, Minneapolis, Minn.
2294. Edison, Thomas A.	May 15, 1896,	Orange, N. J.
2262. Edmunds, Hon. George F.	May 17, 1895,	1724 Spruce St., Philadelphia.
1686. Eliot, Charles W., Pres't	April 21, 1871,	17 Quincy St., Cambridge, Mass.
2272. Elliott, A. Marshall, Prof.	May 17, 1895,	Baltimore, Md.
2313. Ely, Theodore N.	May 21, 1897,	Broad St. Station, Phila.
2356. Emerson, Benj. Kendall, Prof.	Dec. 17, 1897,	Amherst, Mass.
2368. Emmet, W. L. R	Feb'y 18, 1898,	Schenectady, N. Y.
1981. Emmons, S. F., Prof	Jan'y 19, 1883,	U. S. Geological Survey, Washington, D. C.
1943. Evans, Sir John, K.C.B.	Oct. 21, 1881,	Nash Mills, Hemel Hempstead, England.
2254. Ewell, Marshall D., M.D	May 17, 1895,	59 Clark St., Chicago, Ill.

F

2234. Fennell, C	Feb'y 15, 1895,	Cambridge, England.
2180. Field, Robert Patterson	May 16, 1890,	218 S. 42d St., Philadelphia.
2364. Fine, Henry B., Prof.	Dec. 17, 1897,	Princeton, N. J.

Name.	*Date of Election.*	*Present Address.*
2353. Fisher, Sydney George	Dec. 17, 1897,	328 Chestnut St., Philadelphia.
1901. Flint, Austin, Jr., M.D.	April 16, 1880,	14 W. 33d St., New York, N.Y.
2197. Forbes, George, Prof.	Oct. 16, 1891,	84 GreatGeorge St.,S.W.London.
2390. Ford, Paul Leicester.	Dec. 16, 1898,	247 Fifth Ave., New York City.
1170. Fraley, Hon. Fred., LL.D. . .	July 15, 1842,	2017 Delancey Place, Phila.
1912. Fraley, Joseph C.	April 16, 1880,	1833 Pine St., Philadelphia.
1695. Frazer, Persifor, Dr. ès-Sc. Nat.	Jan'y 19, 1872,	928 Spruce St., Philadelphia.
2301. Frazier, Benj. W., Prof.	Dec. 18, 1896,	Lehigh Univ., Bethlehem, Pa.
2171. Friebis, George, M.D.	Dec. 20, 1889,	1906 Chestnut St., Philadelphia.
2179. Fullerton, George S., Rev. . .	May 16, 1890,	89, The Gladstone, Philadelphia.
1739. Fulton, John	April 18, 1873,	136 Park Pl., Johnstown, Pa.
1914. Furness, Horace H., Dr.	April 16, 1880,	Wallingford, Del. Co., Pa.
2306. Furness, Horace Howard, Jr..	Feb'y 19, 1897,	2034 Delancey Place, Phila.
2304 Furness, William H., 3d, M.D. .	Feb'y 19, 1897,	Wallingford, Del. Co., Pa.

G

1988. Garrett, Philip C	April 20, 1883,	Logan P. O., Philadelphia.
2079. Gates, Merrill E.	May 21, 1886,	Amherst, Mass.
1025. Gatschet, Albert S.	Oct. 17, 1884,	1331 F St., N. W., Washington, D. C.
1897. Geikie, Sir Archibald	Jan'y 16, 1880,	28 Jermyn St., London, S. W., England.
1808. Geikie, James, Prof	April 21, 1876,	31 Merchiston Ave., Edinburgh, Scotland.
2067. Genth, F. A., Jr	Feb'y 19, 1886,	103 N. Front St., Philadelphia.
2274. Gibbs, J. Willard, Prof..	May 17, 1895,	121 High St.,New Haven, Conn.
1355. Gibbs, Oliver Wolcott, Prof. .	July 21, 1854,	158 Gibbs Ave., Newport, R. I.
1587. Gill, Theodore N., M.D.	July 19, 1867,	Smithsonian Inst., Washington, D. C.
1800. Gilman, Daniel C., Pres't. . . .	April 21, 1876,	25 N. Charles St.,Baltimore,Md.
2240. Glaisher, James W. L.	Feb'y 19, 1895,	The Shola, Heathfield Road, South Croydon, England.
2233. Glazebrook, Richard T	Feb'y 15, 1895,	4 Sunnyside, Princes Park, Liverpool, England.
2212. Goodale, George Lincoln, Prof.	Feb. 17, 1893,	10 Craigie St., Cambridge,Mass.
2292. Goodspeed, Arthur W., Prof.	May 15, 1896,	Univ. of Pennsylvania, Philadelphia.
2203. Goodwin, Harold.	May 20, 1892,	3927 Locust St., Philadelphia.
2232. Goodwin, W. W., Prof.	Feb'y 15, 1895,	Cambridge, Mass.
1851. Gray, Elisha.	Jan'y 18, 1878,	220 Kinzie St., Chicago, Ill.
2222. Green, Samuel A., M.D.	Oct. 20, 1893,	Historical Soc., Boston, Mass.
1504. Green, William Henry.	April 17, 1863,	Princeton, N. J.
1880. Greene, William H., M.D. . . .	April 18, 1879,	27 S. 5th St., Philadelphia.
2412. Greenman, Milton J., M.D. . .	May 19, 1899,	Wistar Institute, 36th and Darby Road, Philadelphia.
2155. de Gregorio, Marchese Antonio	Dec. 21, 1888,	Al Molo, Palermo, Sicily.
2188. Gregory, Caspar Réné, Prof . .	May 15, 1891,	Naunhofstrasse 25, Marienhöhe, Leipzig-Stotteritz, Germany.
1815. Grote, Augustus Radcliffe . .	Oct. 20, 1876,	Buffalo, N. Y.
2090. de Gubernatis, Angelo, Prof . .	May 21, 1886,	Florence, Italy.
1438. de Guyangos, Don Pascual . .	April 19, 1861,	London, England.

H

2054. Haeckel, Ernst, Prof.	Oct. 16, 1885,	University, Jena, Germany.
1658. Hale, Rev. Edw. Everett . . .	Jan'y 21, 1870,	39 Highland St., Roxbury, Mass.

	Name.	*Date of Election.*	*Present Address.*
1858.	**Hall, Asaph**, Prof.	Jan'y 18, 1878,	U. S. Observatory, Washington, D. C.
1795.	**Hall, Charles Edward**	Oct. 15, 1875,	Westport, Essex County, N. Y.
2397.	**Hall, Charles M**	Dec. 16, 1898,	Niagara Falls, N. Y.
2027.	**Hall, Lyman B.**, Prof.	Jan'y 16, 1885,	Haverford Coll., Haverford, Pa.
2194.	**Hamy, E. T.**	May 15, 1891,	40 Rue Lübeck, Ave. du Trocadero, Paris, France.
1837.	**Harding, George**	Jan'y 20, 1851,	2 36 Chestnut St., Phila.
2186.	**Harris, Joseph S.**	May 20, 1887,	144 School Lane, Germantown.
2246.	**Harrison, Charles C.**, Provost.	Feb'y 15, 1895,	1618 Locust St., Philadelphia.
1827.	**Hart, James Morgan**, Prof.	Feb'y 2, 1877,	I Reservoir Ave., Ithaca, N. Y.
2378.	**Harkness, William**, Prof.	May 20, 1898,	Georgetown Heights, Washington, D. C.
2365.	**Hatcher, John B.**, Prof.	Dec. 17, 1897,	81 Vandeventer Ave., Princeton, N. J.
1764.	**von Hauer, Franz Ritter**	Oct. 16, 1874,	Leoben, Austria.
1681.	**Haupt, Hermann**	April 21, 1871,	The Concord, Washington, D.C.
1862.	**Haupt, Lewis M.**, Prof.	May 3, 1878,	107 N. 35th St., Philadelphia.
2082.	**Hayes, Richard Somers**, Capt.	May 21, 1886,	32 Nassau St., New York, N.Y.
2071.	**Hays, I. Minis**, M.D.	Feb'y, 19, 1886,	266 S. 21st St., Philadelphia.
2395.	**Hay, John**, Hon.	Dec. 16, 1898,	State Dep't, Washington, D.C.
1985.	**Heilprin, Angelo**, Prof.	April 20, 1883,	Acad. of Natural Sciences, Philadelphia.
2283.	**Henderson, C. H**	May 15, 1896,	Chestnut Hill, Philadelphia.
2218.	**Hewett, Waterman T.**, Prof.	May 19, 1893,	Cornell Univ., Ithaca, N. Y.
2266.	**Heyse, Paul**, Ph.D.	May 17, 1895,	Munich, Bavaria.
2349.	**Hildeburn, Charles R**	Oct. 15, 1897,	Care of J. S. Morgan & Co., London, England.
2307.	**Hiller, H. M.**, M.D.	Feb'y 19, 1897,	Care of Charles Hiller, Esq., Kohoka, Mo.
2110.	**Hilprecht, Hermann V.**, Prof.	Dec. 17, 1886,	403 S. 41st St., Philadelphia.
1768.	**Himes, Charles Francis**, Prof.	Oct. 16, 1874,	Dickinson Coll., Carlisle, Pa.
2438.	**Hirst, Barton Cooke**, M.D.	Dec. 15, 1899,	1821 Spruce St., Philadelphia.
1663.	**Hitchcock, Chas. Henry**, Prof.	April 15, 1870,	Dartmouth Coll., Hanover, N.H.
2355.	**Holden, Edward S.**	Dec. 17, 1897,	Smithsonian Institution, Washington, D. C.
2068.	**Holland, James W.**, M.D.	Feb'y 19, 1886,	2006 Chestnut St., Philadelphia.
2440.	**Holmes, William H.**, Prof.	Dec. 15, 1899,	U. S. National Museum, Washington, D. C.
1624.	**Hooker, Sir Joseph D.**	Jan'y 15, 1869,	The Camp, Sunningdale, Eng.
2224.	**Hoppin, J. M.**, Prof.	Oct. 20, 1893,	New Haven, Conn.
2070.	**Horner, Inman**	Feb'y 19, 1886,	1811 Walnut St., Philadelphia.
1696.	**Hough, George W.**, Prof.	Jan'y 19, 1872,	N.W. University, Evanston, Ill.
1698.	**Houston, Edwin J.**, Prof.	Jan'y 19, 1872,	1809 Spring Garden St., Phila.
2346.	**Howe, Henry M.**, Prof.	Oct. 15, 1897,	27 W. 73d St., New York.
2239.	**Huggins, Sir William**, K. C. B.	Feb'y 15, 1895,	90 Upper Tulse Hill, S. W. London.
1843.	**Humphrey, H. C.**	July 20, 1877,	?
2248.	**Hunter, Richard S.**	Feb'y 15, 1895,	1413 Locust St., Philadelphia.
2373.	**Hutchinson, Emlen**	May 20, 1898,	2006 Delancey Place, Phila.
2231.	**Hyatt, Alpheus**, Prof.	Feb'y 15, 1895,	Francis Ave., Cambridge, Mass.
1426.	**Hyrtl, Joseph**, Prof.	July 20, 1860,	k. k. Akad. d. Wissenschaften, Vienna, Austria.

I

1773.	**Ingham, Wm. Armstrong**	April 16, 1875,	320 Walnut St., Philadelphia.
2221.	**d'Invilliers, Edward Vincent**	May 19, 1893,	711 Walnut St., Philadelphia.

J

Name.	*Date of Election.*	*Present Address.*
2010. **James, Edmund J.**, Prof.	April 18, 1884,	Univ. of Chicago, Chicago, Ill.
1933. **Jannet, Claudio**	April 15, 1881,	11 Rue las Casas, Paris, France.
2302. **Jastrow, Morris, Jr.**, Prof.	Feb. 19, 1897,	248 S. 23d St., Philadelphia.
2375. **Jayne, Henry La Barre**	May 20, 1898,	1826 Chestnut St., Phila.
2049. **Jayne, Horace**, M.D.	Oct. 16, 1885,	318 S. 19th St., Philadelphia.
1954. **Jefferis, William W**	Jan'y 20, 1882,	442 Central Park West, New York.
2017. **Jordan, Francis, Jr.**	April 18, 1884,	111 N. Front St., Philadelphia.

K

Name.	*Date of Election.*	*Present Address.*
1989. **Kane, Elisha Kent**	April 20, 1883,	Kushequa, Pa.
2322. **Karpinsky, Alex. Petrovitch**, Prof.	May 21, 1897,	Geological Survey, St. Petersburg, Russia.
2169. **Keane, John J.**, Right Rev.	Dec. 20, 1889,	Washington, D. C.
2422. **Keasbey, Lindley M.**, Prof.	Dec. 15, 1899,	Bryn Mawr, Pa.
2329. **Keen, Gregory B.**	Oct. 15, 1897,	3237 Chestnut St., Philadelphia.
2021. **Keen, William W.**, M.D., Prof.	July 18, 1884,	1729 Chestnut St., Philadelphia.
2392. **Keiser, Edward H.**, Prof.	Dec. 16, 1898,	Bryn Mawr, Pa.
1728. **Kelvin, Lord**	April 18, 1873,	The Library, The University, Glasgow, Scotland.
2278. **Kennelly, A. E.**, D.Sc	Feb. 28, 1896,	Crozer Building, 1420 Chestnut St., Philadelphia.
1708. **King, Clarence**	Oct. 18, 1872,	18 Wall St., New York, N. Y.
1767. **König, George A.**, Prof.	Oct. 16, 1874,	School of Mines, Houghton, Mich.
2389. **Knight, William A.**, Prof.	Dec. 16, 1898,	St. Andrew's, Scotland.
2424. **Kraemer, Henry**, Prof.	Dec. 15, 1899,	145 N. 10th St., Philadelphia.
2167. **Krauss, Friederich S.**, Ph.D.	Dec. 20, 1889,	VII Neustiftgasse 12, Vienna, Austria.

L

Name.	*Date of Election.*	*Present Address.*
1694. **Lambert, Guillaume**, Prof.	Jan'y 19, 1872,	Univ. of Louvain, Belgium.
2411. **Lamberton, William A.**, Prof.	May 19, 1899,	University of Penna., Phila.
2377. **de Lancey, Edward F**	May 20, 1898,	20 E. 28th St., New York, N. Y.
2344. **Lanciani, Rudolfo**, Prof.	Oct. 15, 1897,	2 Via Goito, Rome, Italy.
1858. **Landreth, Burnet**	Jan'y 18, 1878,	Bristol, Pa.
1781. **Langley, Samuel P.**, Sec'y.	April 16, 1875,	Smithsonian Institution, Washington, D. C.
1721. **La Roche, C. Percy**, M.D.	Jan'y 17, 1873,	1518 Pine Street, Philadelphia.
1974. **Lawes, Sir John B.**, Bart.	Jan'y 19, 1883,	Rothamsted, St. Albans, Eng.
1595. **Lea, Henry Charles**	Oct. 18, 1867,	2000 Walnut St., Philadelphia.
2407. **Learned, Marion D.**, Prof.	May 19, 1899,	University of Penna., Phila.
1737. **Le Conte, Joseph**, Prof.	April 18, 1873,	Univ. of California, Berkeley, Cal.
1986. **Lehman, Ambrose E.**	April 20, 1883,	711 Walnut St., Philadelphia.
2182. **Leland, Charles G.**	May 16, 1890,	Baring Bros. & Co., London.
2174. **Le Moine, Hon. J. M.**	Dec. 20, 1889,	Quebec, Canada.
2324. **Leonard, James B.**	Oct. 15, 1897,	The Lincoln, Philadelphia.
1382. **Lesley, J. Peter**, Prof.	July 13, 1856,	Milton, Mass.
2085. **Levasseur, Emile**, Prof.	May 21, 1886,	26, Rue Mons le Prince, Paris, France.
1415. **Lewis, Francis W.**, M.D.	Jan'y 20, 1860,	2016 Spruce St., Philadelphia.
2300. **Lewis, G. Albert**	Dec. 18, 1896,	1834 Delancey Place, Phila.

Name.	*Date of Election.*	*Present Address.*
2338. Libbey, William, Prof.	Oct. 15, 1897,	20 Bayard Ave., Princeton, N.J.
2432. Lippincott, J. Dundas	Dec. 15, 1899,	1333 Walnut St., Philadelphia.
2312. Lister, The Right Hon. Lord	May 21, 1897,	12 Park Crescent, Portland Place, London, England.
1756. Lockyer, Sir Joseph Norman, K. C. B.	April 17, 1874,	Royal College of Science, S. Kensington, London S. W., England.
2435. Loeb, Jacques, Dr.	Dec. 15, 1899,	University of Chicago, Chicago, Ill.
1728. Longchamps, Baron de Selys	April 18, 1873,	Liège, Belgium.
1872. Longstreth, Morris, M.D.	Sept. 20, 1878,	1416 Spruce St., Philadelphia.
2202. Low, Hon. Seth	Feb. 19, 1892,	Columbia College, New York.
2350. Lowell, Percival	Oct. 15, 1897,	Lowell Observatory, Flagstaff, Arizona.
2003. Ludlow, William, Col. U. S. A.	Jan'y 18, 1884,	War Dept., Washington, D.C.
1629. Lyman, Benjamin Smith	Jan'y 15, 1869,	708 Locust St., Philadelphia.

M

Name.	*Date of Election.*	*Present Address.*
2319. Mabery, Charles F., Prof.	May 21, 1897,	57 Adelbert St., Cleveland, O.
2107. MacAlister, James, Pres't.	Dec. 17, 1886,	119 N. 18th St., Philadelphia.
2209. Macfarlane, John M., Prof.	Dec. 16, 1892,	Lansdowne, Delaware Co., Pa.
2404. Mackenzie, Arthur S., Prof.	May 19, 1899,	Bryn Mawr, Pa.
2363. McCay, Leroy W., Prof.	Dec. 17, 1897,	Princeton, N. J.
2366. McClure, Charles F. W., Prof.	Dec. 17, 1897,	Princeton, N. J.
2280. McCook, Henry C., Rev., D.D.	Feb. 28, 1896,	3700 Chestnut St., Philadelphia.
1888. McCreath, Andrew S.	July 18, 1879,	223 Market St., Harrisburg, Pa.
1821. McKean, William V.	Feb'y 2, 1877,	200 N. 19th St., Philadelphia.
2299. Magie, Wm. Francis, Prof.	Dec. 19, 1896,	Princeton, N. J.
2339. Mahan, Alfred T., Capt. U. S. N.	Oct. 15, 1897,	160 W. 86th St., New York.
2042. Mallet, John Wm., M.D.	Jan'y 16, 1885,	University of Virginia, Charlottesville, Va.
1847. Mansfield, Ira Franklin	Jan'y 18, 1878,	Cannelton, Beaver Co., Pa.
1857. March, Francis Andrew, Prof.	Jan'y 18, 1878,	Lafayette College, Easton, Pa.
1861. Marks, William D., Prof.	May 3, 1878,	Westport, Essex Co., N. Y.
2078. Marshall, John, M.D	May 21, 1886,	1718 Pine St., Philadelphia.
2184. Mascart, E., Prof.	Dec. 19, 1890,	176 Rue de l'Université, Paris, France.
1572. Mason, Andrew	Jan'y 18, 1867,	30 and 32 Wall St., New York.
2431. Mason, Otis T., Prof.	Dec. 15, 1899,	Washington, D. C.
2279. Mason, Wm. Pitts, M.D., Prof.	Feb. 28, 1896,	Rensselaer Polytechnic Institute, Troy, N. Y.
2196. Maspero, Gaston, Prof.	May 15, 1891,	Paris, France.
2427. Matthews, Albert.	Dec. 15, 1899,	145 Beacon St., Boston, Mass.
1486. Max-Mueller, Prof., Rt. Hon. Friedrich.	Jan'y 16, 1863,	University of Oxford, Oxford, England.
1677. Meehan, Thomas	Jan'y 20, 1871,	Germantown, Philadelphia.
2399. Meigs, Arthur V., M.D.	May 19, 1899,	1322 Walnut St., Philadelphia.
2115. von Meltzel, Hugo, Prof. Dr.	Dec. 17, 1886,	Koloszvar, Hungary.
2339. Melville, Geo. W., Como. U.S.N.	Oct. 15, 1897,	Navy Dept., Washington, D. C.
2430. Mendenhall, Thomas C, Prof.	Dec. 15, 1899,	Worcester, Mass.
2387. Mengarini, Guglielmo, Prof.	May 20, 1898,	Rome, Italy.
2251. Mercer, Henry C.	Feb. 15, 1895,	Doylestown, Pa.
1903. Merrick, John Vaughan	April 16, 1880,	Roxborough, Philadelphia.
1947. Merriman, Mansfield, Prof.	Oct. 21, 1881,	Lehigh Univ., Bethlehem, Pa.

	Name.	*Date of Election.*	*Present Address.*
1744.	Messchert, Matthew Huizinga.	Oct. 17, 1873,	Douglassville, Berks Co., Pa.
2436.	Meyer, A. B., Prof.	Dec. 15, 1899,	K. Zoölogisches u. Anthropologisch-Ethnographisces Museum, Dresden, Germany.
2142.	Michael, Mrs. Helen Abbott	May 20, 1887,	44 Mt. Vernon St., Boston, Mass.
2423.	Miller, Leslie W., Prof.	Dec. 15, 1899,	N. W. cor. Broad and Pine Sts., Philadelphia.
2284.	Minot, Chas. Sedgwick, M.D.	May 15, 1896,	Harvard Univ., Cambridge, Mass.
2175.	Mitchell, Hon. James T.	Feb'y 21, 1890,	1722 Walnut St., Philadelphia.
1461.	Mitchell, S. Weir, M.D	Jan'y 17, 1862,	1524 Walnut St., Philadelphia.
2267.	Montegazza, Paolo	May 17, 1895,	Florence, Italy.
2367.	Montgomery, Thomas H., Jr.	Feb'y 18, 1898,	Wistar Institute, 36th and Darby Road, Philadelphia.
2323.	Moore, Clarence B.	Oct. 15, 1897,	1321 Locust Street, Phila.
2029.	Moore, James W., M.D.	Jan'y 16, 1885,	Lafayette College, Easton, Pa.
1841.	Morehouse, George R., M.D.	April 20, 1877,	2033 Walnut St., Philadelphia.
2340.	Morley, Frank, Prof.	Oct. 15, 1897,	Haverford, Pa.
2409.	Morris, Harrison S.	May 19, 1899,	Academy of Fine Arts, Philadelphia.
2397.	Morris, Israel W.	May 19, 1899,	225 So. 8th St., Philadelphia.
1976.	Morris, J. Cheston, M.D.	Jan'y 19, 1883,	1514 Spruce St., Philadelphia.
2265.	Morse, Edward S., Prof.	May 17, 1895,	Essex Institute, Salem, Mass.
1577.	Morton, Henry, Pres't.	Jan'y 18, 1867,	Hoboken, N. J.
2121.	Much, Mathæus, Ph.D.	Dec. 17, 1886,	XIII Penzingerstrasse, 84, Vienna, Austria.
1866.	Muhlenberg, Rev. Fred A.	Sept. 20, 1878,	34 S. 5th St., Reading, Pa.
2192.	Munroe, Charles E., Prof.	May 15, 1891,	Columbian Univ., Washington, D. C.
2062.	Murdock, J. B., Lieut. U.S.N.	Feb'y 19, 1886,	Navy Dept., Washington, D.C.
1937.	Murray, James A. H.	April 15, 1881,	Sunnyside, Banbury Road, Oxford, England.

N

2087.	de Nadaillac, Marquis	May 21, 1886,	18 Rue Duphot, Paris, France.
2316.	Nansen, Fridtjof	May 21, 1897,	Godthaab, Lysaker, Norway.
1852.	Newcomb, Simon, Prof.	Jan'y 18, 1878,	Washington, D. C.
1703.	Nichols, Starr Hoyt	July 19, 1872,	61 Exchange Place, New York, N. Y.
2060.	Nikitin, Serge, Chief Geol.	Feb'y 19, 1866,	Geological Survey, St. Petersburg, Russia.
1805.	Nordenskiöld, Adolf Eric, Prof.	April 21, 1876,	Stockholm, Sweden.
1712.	Norris, Isaac, M.D.	Oct. 18, 1872,	Fair Hill, Bryn Mawr, Pa.
2106.	Norris, William F., M.D.	Dec. 17, 1886,	1530 Locust St., Philadelphia.
2016.	North, Edward, LL.D., Prof.	Oct. 16, 1885,	Hamilton College, Clinton, N.Y.
2269.	Nuttall, Mrs. Zelia	May 17, 1895,	Care of London County Bank, Oxford, England.

O

2072.	Oliver, Charles A., M.D.	Feb'y 19, 1886,	1507 Locust St., Philadelphia.
2354.	Olney, Richard, Hon	Dec. 17, 1897,	23 Court Street, Boston.
2195.	Oppert, Julius, Prof.	May 15, 1891,	Paris, France.
2362.	Ortmann, Arnold E., Prof.	Dec. 17, 1897,	66 Williams St., Princeton, N.J.
2135.	Osborn, Henry F., Prof.	Feb'y 18, 1887,	American Museum of Natural History, New York.
2039.	Osler, William, M.D	Jan'y 16, 1885,	1 West Franklin St., Baltimore, Md.

P

Name.	*Date of Election.*	*Present Address.*
1868. PACKARD, A. S., M.D.	Sept. 20, 1878,	Providence, R. I.
1578. PACKARD, JOHN H., M.D.	Jan'y 18, 1867,	Hotel Stenton, Philadelphia.
2396. PANCOAST, HENRY S	Dec. 16, 1898,	267 E. Johnson St., Germantown, Phila.
2035. PATTERSON, C. STUART	Jan'y 16, 1885,	1000 Walnut St., Philadelphia.
2385. PATTERSON, LAMAR GRAY	May 20, 1898,	176 Washington St., Cumberland, Md.
1282. PATTERSON, ROBERT	April 18, 1851,	329 Chestnut St., Philadelphia.
1320. PATTERSON, THOMAS LEIPER	April 15, 1853,	176 Washington St., Cumberland, Md.
2213. PATTISON, ROBERT E., Hon	Feb. 17, 1893,	5930 Drexel Rd., Overbrook, Pa.
2357. PATTON, FRANCIS L., D.D., Pres't	Dec. 17, 1897,	Princeton, N. J.
2428. PAUL, J. RODMAN	Dec. 15, 1899,	903 Pine St., Philadelphia.
1772. PEARSE, JOHN B.	Jan'y 15, 1875,	317 Walnut Av., Roxbury, Mass.
2318. PECKHAM, S. F., Prof.	May 21, 1897,	Ann Arbor, Mich.
1859. PEIRCE, C. NEWLIN	May 3, 1878,	1415 Walnut St., Philadelphia.
1722. PEMBERTON, HENRY	Jan'y 17, 1873,	1947 Locust St., Philadelphia.
2104. PEÑAFIEL, ANTONIO	May 21, 1886,	Ciudad, Mexico, Mexico.
2073. PENNYPACKER, SAMUEL W., Hon.	May 21, 1886,	1540 N. 15th St., Philadelphia.
1518. PENROSE, R. A. F., M.D.	July 17, 1863,	1331 Spruce St., Philadelphia.
2059. PEPPER, EDWARD, M.D.	Feb'y 19, 1886,	El Afia, El Biar, Alger, Algerie
2333. PEPPER, GEORGE WHARTON	Oct. 15, 1897,	701 Drexel Building, Phila.
2383. PETTEE, WILLIAM HENRY, Prof.	May 20, 1898,	554 Thomson St., Ann Arbor, Mich.
2281. PETTIT, HENRY	Feb. 28, 1895,	5951 Overbrook Ave., Philadelphia.
2261. PHELPS, EDWARD J., Hon.	May 17, 1895,	Burlington, Vt.
2403. PHILLIPS, FRANCIS C., Prof.	May 19, 1899,	P. O. Box 126, Allegheny, Pa.
2295. PICKERING, EDW. C., Prof.	May 15, 1896,	Harvard Univ., Mass.
2342. PIERSOL, GEORGE A., M.D.	Oct. 15, 1897,	Chester Ave. and 49th St., Philadelphia.
2277. PILSBRY, HENRY A., Prof.	Dec. 20, 1895,	Academy of Natural Sciences, Philadelphia.
2374. PLATT, CHARLES	May 20, 1898,	237 S. 18th St., Philadelphia.
1760. PLATT, FRANKLIN	July 17, 1874,	1617 Chestnut St., Philadelphia.
2127. PLATZMANN, JULIUS, Ph.D.	Dec. 17, 1886,	Reichsstrasse 2, Leipzig, Germany.
2415. POINCARÉ, HENRI, Prof.	May 19, 1899,	Rue Claude Bernard, Paris, France.
2053. POMIALOWSKY, JOHN, Prof.	Oct. 16, 1885,	St. Petersburg, Russia.
1539. PORTER, THOMAS C., Rev.	Oct. 21, 1861,	Paxinosa Ave., Easton, Pa.
2097. POSTGATE, JOHN P., Prof.	May 21, 1886,	Cambridge, England.
2161. POWELL, J. W.	Oct. 18, 1889,	910 M. St., N. W., Washington, D. C.
2437. PREECE, SIR WILLIAM HENRY	Dec. 15, 1899,	13, Queen Anne's Gate, London, S. W., England.
2382. PRESCOTT, ALBERT B., Prof.	May 20, 1898,	734 S. Ingalls St., Ann Arbor, Mich.
1780. PRIME, FREDERICK	April 16, 1875,	1008 Spruce St., Philadelphia.
2414. PRITCHETT, HENRY S	May 19, 1899,	U. S. Coast Survey, Washington, D. C.
1758. PUMPELLY, RAPHAEL	April 17, 1874,	Newport, R. I.
2293. PUPIN, MICHAEL I., Prof.	May 15, 1896,	7 Highland Pl., Yonkers, N. Y.
2268. PUTNAM, F. W., Prof.	May 15, 1895,	Peabody Museum, Cambridge, Mass.

R

Name.	*Date of Election.*	*Present Address.*
2131. Rada, Juan de Dios-y Delgado,	Dec. 17, 1886,	Calle de la Corredera baja de S. Pablo No. 12, Madrid, Spain.
2401. Ramsay, William, Prof.	May 19, 1899,	University College, Gower St., W. C., London, Eng.
1736. Rand, Theodore D	April 18, 1873,	Radnor, Del.Co., Pennsylvania.
1849. Randall, F. A., M.D.	Jan'y 18, 1878,	Warren, Pa.
2391. Rawle, Francis	Dec. 16, 1898,	"The Lincoln," Philadelphia.
2398. Rawle, William Brooke. . . .	May 19, 1899,	230 So. 22d St., Philadelphia.
2099. Rayleigh, John W. S., Lord . .	May 21, 1886,	TerlingPl.,Witham,Essex,Eng.
1784. Raymond, Rossiter W.	April 16, 1875,	99 John St., New York, N. Y.
2381. Redwood, Boverton	May 20, 1898,	4, Bishopsgate St. Withim, London, England.
2405. Remington, Joseph P., Prof. . .	May 19, 1899,	1832 Pine St., Philadelphia.
1889. Remsen, Ira, Prof.	July 18, 1879,	Johns Hopkins Univ., Baltimore, Md.
1948. Renard, A. F., Prof.	Oct. 21, 1881,	Acad. of Sciences, Brussels, Belgium.
1343. Renard, Charles, M.D.	Jan'y 20, 1854,	Moscow, Russia.
1890. Renevier, E., Prof.	July 18, 1879,	Univ. Lausanne, Switzerland.
1816. Reuleaux, F., Prof.	Feb'y 2, 1877,	Ahornstrasse 2, Berlin, Germany.
2122. Réville, Albert, Prof.	Dec. 17, 1886,	21 Rue Guénêgaud, Paris, France.
2315. Rhoads, Samuel Nicholson . .	May 21, 1897,	Academy of Natural Sciences, Philadelphia.
2226. Roberts, Isaac	Oct. 20, 1893,	Starfield, Crowborough, Sussex, England.
1957. Robins, James W., Rev	April 21, 1882,	2023 Pine St., Philadelphia.
1390. Rogers, Fairman	Jan'y 16, 1857,	Univ. of Pennsylvania, Philadelphia.
2177. Rogers, Robert W., Prof. . . .	Feb'y 21, 1890,	Drew Theological Seminary, Madison, N. J.
1462. Rohrig, F. L. Otto, Prof.	April 18, 1862,	Los Angeles, Cal.
2050. Rollett, Hermann, Ph.D. . . .	Oct. 16, 1885,	Baden bei Wien, Austria.
1907. Rood, Ogden N., Professor . . .	April 16, 1880,	Columbia College, New York.
2198. Rosengarten, Joseph G.	Oct. 16, 1891,	1704 Walnut St., Philadelphia.
1964. de Rosny, Léon, Prof.	July 21, 1882,	47 Ave. Duquêsne, Paris, France.
1838. Rothrock, Joseph T., Prof. . .	April 20, 1877,	West Chester, Pa.
2291. Rowland, Henry A., Prof. . .	May 15, 1896,	JohnsHopkinsUniv.,Baltimore
1620. Rütimeyer, Carl L., Prof. . . .	Jan'y 15, 1869,	Basle, Switzerland.

S

2230. Sachse, Julius F.	Feb'y 16, 1894,	4428 Pine St., Phila.
1766. Sadtler, Samuel P., Prof. . . .	Oct. 16, 1874,	1042 Drexel Building, Phila.
2148. Sajous, Charles E., M.D	Feb'y 17, 1888,	2043 Walnut St., Philadelphia.
2358. Sampson, Alden. . . .	Dec. 17, 1897,	Haverford, Pa.
1563. Sandberger, Fredolin, Prof. .	April 20, 1866,	Univ. of Würtzburg, Bavaria.
2327. Sanders, Richard H.	Oct. 15, 1897,	1225 Locust St., Philadelphia.
1958. Sargent, Charles Sprague, Prof.	April 21, 1882,	Jamaica Plain, Mass.
1730. Saussure, Henri de.	April 18, 1873,	Geneva, Switzerland.
2211. Schäffer, Charles, M.D. . . .	Feb'y 17, 1893,	1309 Arch St., Philadelphia.
1498. Schott, Charles Anthony, Prof.	April 17, 1863,	U. S. Coast and Geodetic Survey, Washington, D. C.
1864. Schurz, Carl, Hon	Sept. 20, 1878,	54 William St., New York, N.Y.

Name.	*Date of Election.*	*Present Address.*
1725. Sclater, Philip Lutley	April 18, 1873,	3 Hanover Square, London, W· England.
2372. Scott, C. F.	Feb'y 18, 1898,	Pittsburgh, Pa.
2112. Scott, W. B., Prof.	Dec. 17, 1886,	Princeton, N. J.
1870. Scudder, Samuel Hubbard.	Sept. 20, 1878,	Cambridge, Mass.
2352. See, T. J. J., LL.D.	Dec. 17, 1897,	Lowell Observ., Flagstaff, Ariz.
1704. Sellers, Coleman.	July 19, 1872,	3301 Baring St., Philadelphia.
3420. Sellers, Coleman, Jr.	Dec. 15, 1899,	410 N. 33d St., Philadelphia.
1533. Sellers, William.	April 15, 1864,	Clifton, Edgemoor, Delaware.
1770 Selwyn, Alfred R. C., LL.D.	Oct. 16, 1874,	28 Nepean St., Ottawa, Canada.
2057 Sergi, Giuseppe, Prof.	Oct. 16, 1885,	Università Romana, Rome, Italy
2410. Shapleigh, Waldron	May 19, 1899,	2223 Delancey Pl., Philadelphia.
2076. Sharp, Benjamin, M.D.	May 21, 1886,	317 N. 35th St., Philadelphia.
1944. Sharples, Philip Price	Oct. 21, 1881,	West Chester, Pennsylvania.
1960. Sharples, Stephen Paschall.	April 21, 1882,	13 Broad St., Boston, Mass.
1797. Sherwood, Andrew	Oct. 15, 1875,	Mansfield, Tioga Co., Penna.
1822. Shields, Chas. W., Rev., D.D.	Feb y 2, 1877,	Princeton, N. J.
2351. Smith, A. Donaldson, M.D	Oct. 15, 1897,	Care of S. H. Thomas, 210 S. 4th St., Phila.
2146. Smith, Edgar F., Prof,	Oct. 21, 1887,	210 S. 37th St., Philadelphia.
1789. Smith, Stephen, M.D	Oct. 15, 1875,	57 W. 42d St., New York, N. Y.
2335. Smock, John C., Prof.	Oct. 15, 1897,	Trenton, N. J.
2141. Smyth, Albert H., Prof.	May 20, 1887,	Radnor, Delaware Co., Pa.
2229. Snellen, Herman, Jr., Ph.D.	Feb'y 16, 1894,	Utrecht, Netherlands.
1742. Snowden, A. Loudon	Oct. 17, 1873,	1812 Spruce St., Philadelphia.
2009. Snyder, Monroe B., Prof.	Jan'y 18, 1884,	2402 N. Broad St., Philadelphia.
1720. Spofford, A. R.,	Jan'y 17, 1873,	Washington, D. C.
2332. Squibb, Edward R., M.D	Oct. 15, 1897,	152 Columbia Heights, Brooklyn, N. Y.
1949. Stallo, Hon. John B.	Oct. 21, 1881,	Cincinnati, O.
2348. Stephens, H. Morse, Prof.	Oct. 15, 1897,	Cornell Univ., Ithaca, N. Y.
1990. Stevens, Walter LeConte, Prof.	Jan'y 18, 1884,	Rensselaer Polytechnic Institute, Troy, N. Y.
1840. Stevenson, John James, Prof.	April 20, 1877,	University Heights, New York, N. Y.
2276. Stevenson, Sara Y.	Oct. 18, 1895,	237 S. 21st St., Philadelphia.
2371. Stillwell, L. B.	Feb'y 18, 1898,	Buffalo Ave., Niagara Falls, N.Y.
2168. Stokes, Sir George G., Bart.	Dec. 20, 1889,	Lensfield Cottage, Cambridge, England.
2193. Stubbs, Rt. Rev. William, Lord Bishop of Oxford	May 15, 1891,	Cleveden Palace, Oxford, Eng.
2094. Suess, Edward, Prof.	May 21, 1886,	Geol. Reichsanstalt, Vienna, Austria.
2258. Sulzberger, Mayer, Hon.	May 17, 1895,	1303 Girard Ave., Philadelphia
2092. Szombathy, Josef, Prof.	May 21, 1886,	Burgring 7, Vienna, Austria.

T

2328. Tatham, William	Oct. 15, 1897,	1811 Walnut St., Philadelphia.
2243. Taylor, Isaac, Rev.	Feb'y 15, 1895,	York, England.
2098. Temple, Richard Carnac, Lt.-Col.	May 21, 1886,	Port Blair, Andeman Islands.
2289. Tesla, Nikola	May 15, 1896,	46 E. Houston St., New York.
2006. Thomas, Allen C., Prof.	Jan'y 18, 1884,	Haverford, Pa.
1993. Thompson, Heber S.	Jan'y 18, 1884,	Pottsville, Pa.
1726. Thompson, Sir Henry	April 18, 1873,	35 Wimpole St., Cavendish Square, London, England.

	Name.	*Date of Election.*	*Present Address.*
1807.	Thomson, Elihu, Prof.	April 21, 1876,	Swampscott, Mass.
1909.	Thomson, William, M.D.	April 16, 1880,	1426 Walnut St., Philadelphia
2052.	im Thurn, Everard F.	Oct. 16, 1885,	Pomeroon River, Georgetown, British Guiana, S. A.
1530.	Thury, A., Prof.	April 15, 1864,	Univ. of Geneva, Switzerland.
2379.	Tiele, D. P., Prof.	May 20, 1898,	Stationsveg 23, Leyden.
1688.	Tilghman, Benjamin C.	July 21, 1871,	1114 Girard St., Philadelphia.
1657	Tilghman, William M.	Jan'y 21, 1870,	1114 Girard St., Philadelphia.
2176.	Timmins, Samuel	Feb. 21, 1890,	Arley, near Coventry, England.
2123.	Topinard, Paul, Prof.	Dec. 17, 1886,	105 Rue de Rennes, Paris.
2065.	Toppan, Robert Noxon.	Feb'y 19, 1886,	54 Highland St., Cambridge, Mass.
2249.	Tower, Charlemagne, Jr., Hon.	Feb'y 15, 1895,	U. S. Embassy, St. Petersburg, Russia.
2418.	Trevelyan, George Otto, Rt.-Hon. Sir	May 19, 1899,	8 Grosvenor Crescent, S. W., London, England.
2288.	Trowbridge, John, Prof.	May 15, 1896,	Harv. Univ., Cambridge, Mass.
2024.	Trumbull, Henry C., Rev., D.D.	July 18, 1884,	1031 Walnut St., Philadelphia.
2321.	Tschernyschew, Theodore.	May 21, 1897,	Geological Survey, St. Petersburg, Russia.
1973.	Tschermak, Gustav.	Oct. 20, 1882,	Universität, Vienna, Austria.
1529.	v. Tunner, Peter R., Prof.	April 15, 1864,	Leoben, Austria.
1983.	Turrettini, Theodore, Prof	Dec. 19, 1890,	Geneva, Switzerland.
2166.	Tuttle, David K	Oct. 18, 1889,	U. S. Mint, Philadelphia.
2163.	Tyler, Lyon G., Pres't.	Oct. 18, 1889,	Williamsburg, Va.
2138.	Tyson, James, M.D	May 20, 1887,	1506 Spruce St., Philadelphia.

U

2185.	Unwin, William C., Prof.	Dec. 19, 1890,	7 Palace Gate Mansions, London, England.

V

2400.	Vauclain, Samuel M.	May 19, 1899,	1533 Green St., Philadelphia.
2325.	Vaux, George, Jr.	Oct. 15, 1897,	404 Girard Building, Phila.
2045.	de Vere, M. Schele, Prof.	Oct. 16, 1885,	University of Virginia, Charlottesville, Va.
1475.	Virchow, Rudolph, Prof.	Oct. 17, 1862,	Universität, Berlin, Germany.
1670.	Vose, George L., Prof.	Oct. 21, 1870,	Massachusetts Institute of Technology, Boston.
2186.	Vossion, Louis	Dec. 19, 1890,	Consulate of France, Honolulu.

W

2034.	Wagner, Samuel.	Jan'y 16, 1885,	Greenbank Farm, West Chester, Pa.
1748.	Wahl, William H.	Jan'y 16, 1874,	15 S. 7th St., Philadelphia.
2331.	Walcott, Charles D.	Oct. 15, 1897,	U. S. Geological Survey, Washington, D. C.
1724.	Wallace, Alfred Russel.	April 18, 1873,	Parkstone, Dorset, England.
2156.	Ward, Lester F.	May 17, 1889,	1464 Rhode Island Ave., Washington, D. C.
1925.	Ware, Lewis S	Jan'y 21, 1881,	Phila. Book Co., 15 S. 9th St., Phila.
2359.	Warfield, Ethelbert D., Pres't	Dec. 17, 1897,	Easton, Pennsylvania.